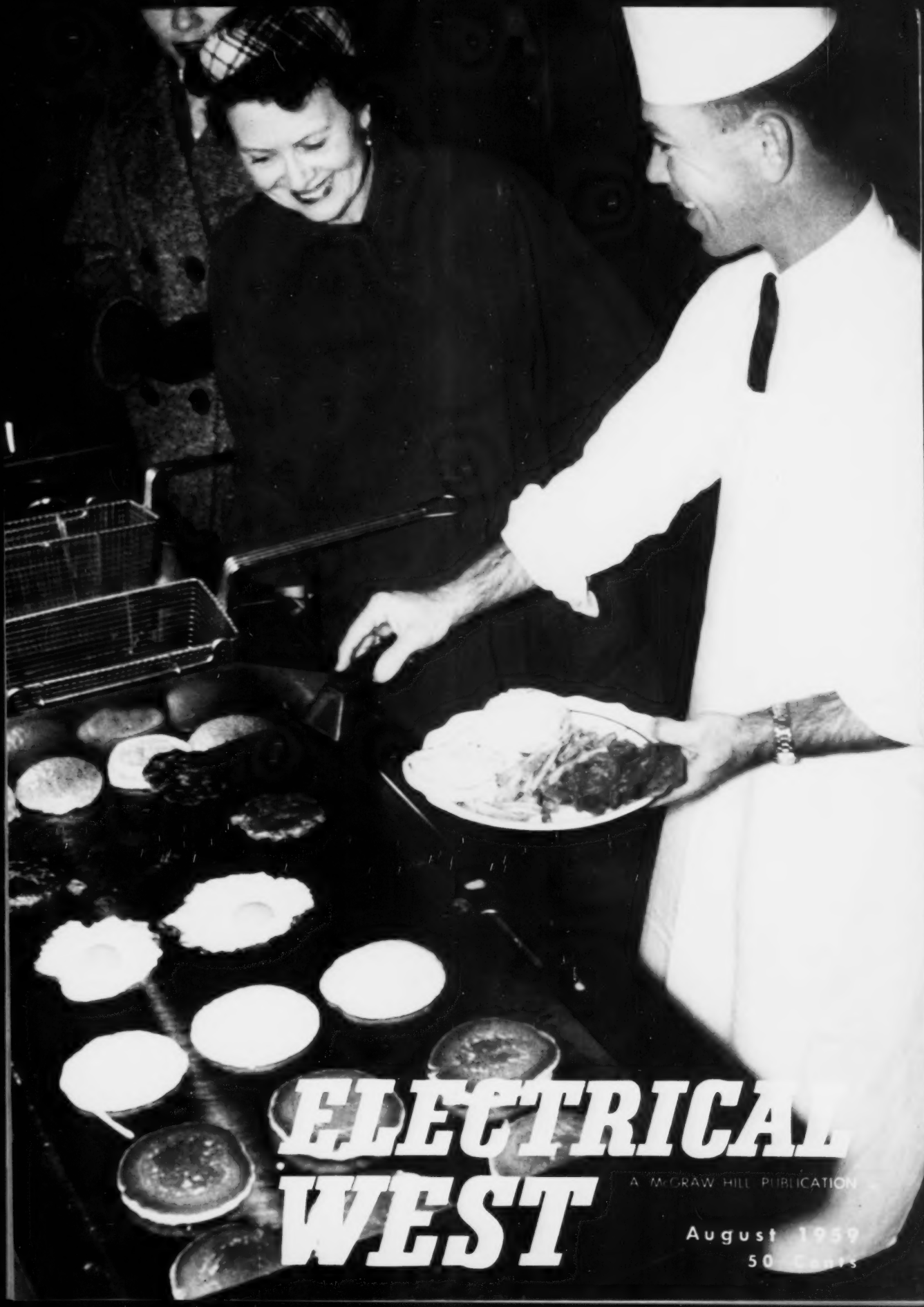
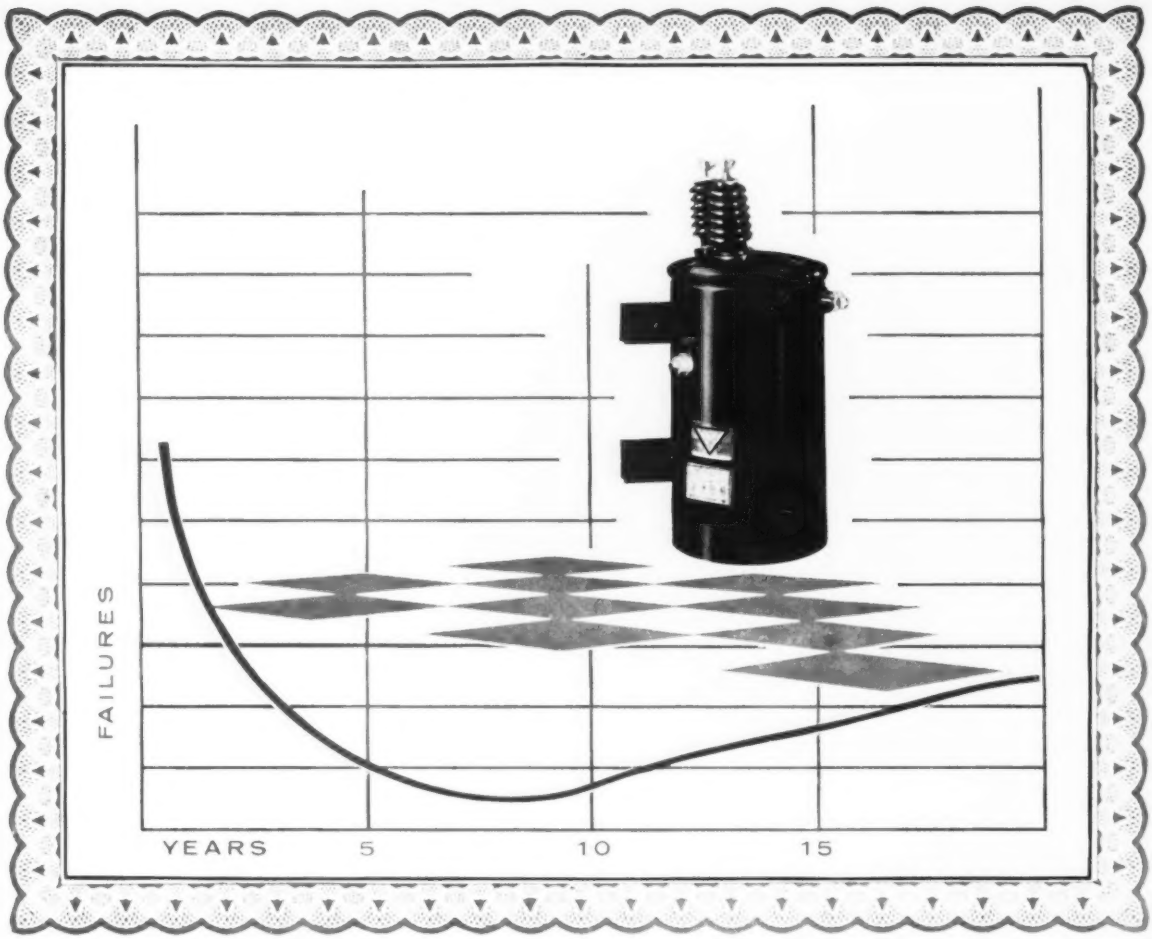


ELECTRICAL WEST

A McGRAW HILL PUBLICATION

August 1959
50 Cents



GUARANTEED

for 5 years — further proof of the exceptional quality built into every RT&E Transformer to save you money. The wisdom of this guarantee is borne out by the graph above. This typical mortality curve was developed from actual failure rates of one leading utility and covers all makes of transformers. It shows clearly that most transformer failures due to workmanship and materials occur during the first 5 years of use, the critical period covered by the RT&E guarantee.

In addition to this 5 year guarantee against defective materials and workmanship, RT&E also guarantees all fully protected transformers unconditionally for one full year.

RT&E CORPORATION
WAUKESHA, WISCONSIN
PORTLAND, OREGON

EE

editorial views

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Impressions From the Floor— BPA, in a noteworthy attempt to forestall the effects of inflation by selling dump power to PG and E, has spawned a panther. It could be a simple transaction. BPA has dump power to sell. PG and E has a peak at the time of surplus. Power lines come within 90 miles. If the price is right, the construction of a simple tie would be good business. *But*

Up jump the Governors (take serious note of this). The present predisposition for the three Western politically ambitious governors to seize on this situation is as ominous as it is transparent. They want a hand in power planning.

Also up jump the federal planners. This power may never materialize and most probably will be firmed in five to ten years. This seems a scant excuse for **BPA'S making a 25-year study of Western power requirements.** But that's what the public power proponents want.

The private utilities might well take note of these efforts to "tune up" for 1960. As an industry we need to know where our *industry* is going long term. System by system plans are not sufficient and politically vulnerable. We need to make long range plans and keep them up to date. We need to act *together* in the best interests of our users.

As we stated last month—if we don't there are those who will.

Superhuman— Southern California Edison's recent order for a General Electric Computer to start up—operate and shut down the 200,000-kw units at Huntington Beach represents a significant first for this utility. The decision hinged not on operating economics, but on Edison's recognition that maxmum operating efficiency in a modern steam station exceeds the ability of the human animal to sense, to evaluate and to act in time. The consequences of this human limitation is a growing hazard to personnel and risk of station damage valued in the millions.

The automated equipment estimated to add $5 per kw to station costs, will scan 300 points per second and an additional 500 points each minute. Superhuman indeed!

Edison officials hope for fuel savings, increased continuity and reduced operating and maintenance costs. But these benefits are secondary. Congratulations to Edison for seeing in its franchise the obligation to innovate.

Communications Needed— The most impressive single fact coming out of the spring conferences and conventions was the unanimity of opinion of speakers on the need for better internal communications up and down within a company. Another salient fact concerned the almost universal recommendation that businessmen take more interest in politics. Still another was the important place on the human relations aspect of management and the importance of good supervision.

All of these things reflect a growing awareness of the dangers of the burdensome taxation and crackpot legislation that unbridled political ambition breeds. All of them hint that not enough people know exactly what is going on in the political and economic scene. All indicate that it's not so much that people are unintelligent as they are uninformed and unaroused.

It is not enough for management to think or believe that it has good communications within the organization. Means must be devised to test the efficiency of the various channels over which ideas and information pass. Corporate self-appraisal in this regard is probably the first step in developing an informed nucleus of intelligent voters.

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ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S. Established 1887

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The Cover—George Klopp of Hotpoint demonstrates new equipment at commercial cooking show in Santa Rosa, Calif., sponsored by Pacific Gas and Electric Co.'s North Bay Division. Photo by Electrical West's Jack Robinson. See story, p 59.

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Electrical West (with which is consolidated The Journal of Electricity), August 1959, Vol. 123, No. 2. Published semimonthly except November when published trimonthly by McGraw-Hill Company of California, James H. McGraw (1860-1948) Founder. Office of publication, 235 N.W. Park Ave., Portland 9, Ore. See panel below for directions regarding subscriptions or change of address.

Executive, editorial, circulation and advertising offices: 68 Post St., San Francisco 4, Calif. Donald C. McGraw, chairman of the board; George C. Tenney, president; John W. Otterson, vice-president; B. M. Boccoli, secretary and treasurer.

Position and company connection must be indicated on subscription orders. Send to address shown in panel below. Subscription price includes the regular monthly issue, the news letter issue and the November directory issue. United States subscription rate $3 a year, single copies 50c (November directory issue $1). Latin American Republics and Philippine Islands $4 a year; Canada $3.50 a year; all other countries $4 a year. Entered as second class matter, Dec. 17, 1956, at the post office at Portland, Ore., under the act of March 3, 1879. Printed in U. S. A. Title registered in U. S. Patent Office.

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SUBSCRIPTIONS: Send subscription correspondence and change of address to Subscription Manager, Electrical West, 68 Post St., San Francisco 4, Calif. Allow 30 days for change of address.

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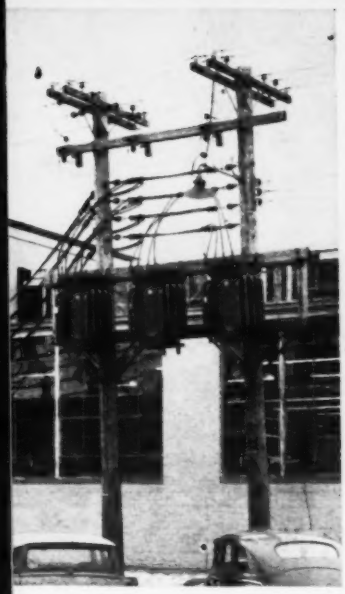

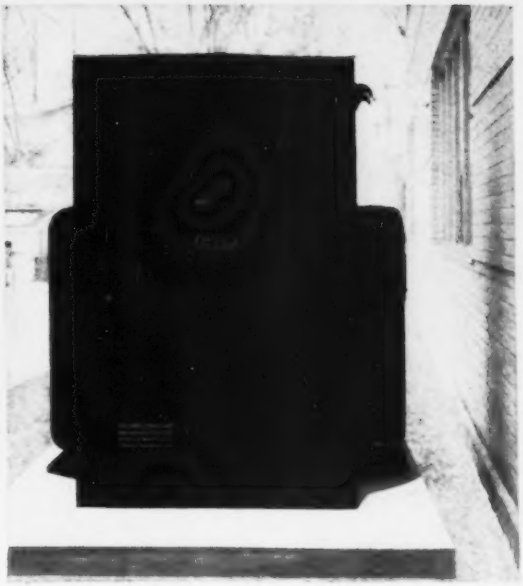

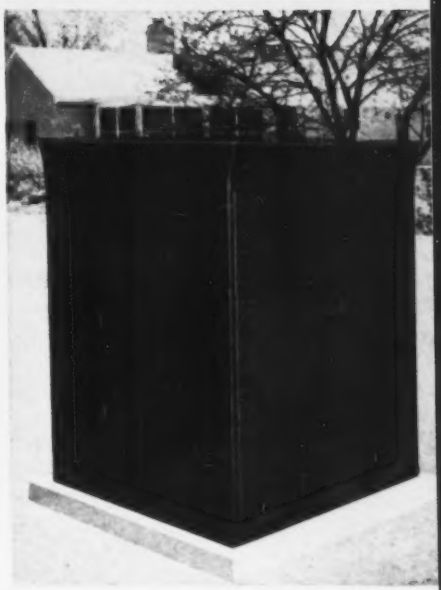

APPEARANCE is one important reason for going from overhead to underground construction. Today, the utilities working with Line Material have equipment available such as this L-M 12 kv, 300 kva, three-phase Pad-Mount transformer to replace the older-style pole-mounted bank.

ANOTHER SOLUTION to unsightly overhead banking is the Line Material Transclosure. Originally designed for either standard single or three-phase, pole-type distribution transformers, it can also be used singly or ganged to provide as much space as is needed for switching and protective devices.

New Developments Continue L-M Leadership in Underground Distribution Equipment

L-M Engineers continue development of new products to help utilities find the most practical, economical solutions to the growing pressures for underground distribution.

By **R. C. KIRK**, Vice President
Research and Engineering, Line Material Industries

As utility men know, there are growing pressures in many areas, to install distribution lines underground. These pressures come from the public, from subdividers and builders, and from communities.

New L-M Developments Help Cut Cost

Recognizing that these pressures are continually increasing, Line Material over three years ago, began working with utilities to produce equipment that would economically and practically solve this problem. The result is additional equipment from L-M which offers substantial reductions in underground distribution system costs, namely:

1 The Pad-Mount Transformer—a distribution transformer with a self-contained enclosure for terminals, switching and protective equipment that can be mounted on a ground-level pad or on a rooftop.

2 The Transclosure—a ventilated steel enclosure, also mounted on a ground-level pad, for pole-type distribution transformers, protective and switching equipment, load transfer equipment; can also accommodate service meters and telephone equipment.

3 The Power Pedestal—a stake-mounted pedestal for above-ground connection and termination of underground secondary services and secondary mains.

Underground Distribution Headquarters

Because of our extensive work in this field we logically consider Line Material as "Underground Distribution Headquarters." We would be happy to share our knowledge with you and would appreciate the opportunity of showing how our products can provide a practical and economical solution to your underground problems. Contact your L-M Field Engineer, or write me direct at Line Material Industries, Milwaukee 1, Wisconsin.

409

LINE MATERIAL® Industries
McGRAW-EDISON COMPANY

McGRAW EDISON

Underground Distribution Headquarters

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
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J. COLEMAN JONES, GENERAL SUPERINTENDENT,
TELLS WHY . . .

DEPENDABILITY pays dividends for Pacific Power & Light's investment in General Electric voltage regulators

"We use many General Electric three-phase step regulators for efficient system voltage control at the substation. Over the years, General Electric MLT-32 regulators have paid us dividends in dependable performance."

Dependability means highly-reliable equipment operation with least-possible maintenance. General Electric controlled speed switching results in fast-break, slow-make tap changes for minimum contact wear and prolonged regulator life. Hydraulic dashpots and redesigned Geneva gears reduce switching noise.

GENERAL ELECTRIC REGULATORS COST LESS ON THE LINE because you get continuing Extra Dividends . . . from **G-E DEPENDABILITY**—absolute minimum maintenance; in **G-E SERVICE**—routine or emergency; from **G-E RESEARCH**—superior regulating equipment. Result: Extra values = **LOWER COSTS.**

Only General Electric returns so much for your regulator investment. Ask your General Electric regulator representative to show you how. General Electric Co., Schenectady 5, New York. 428-59

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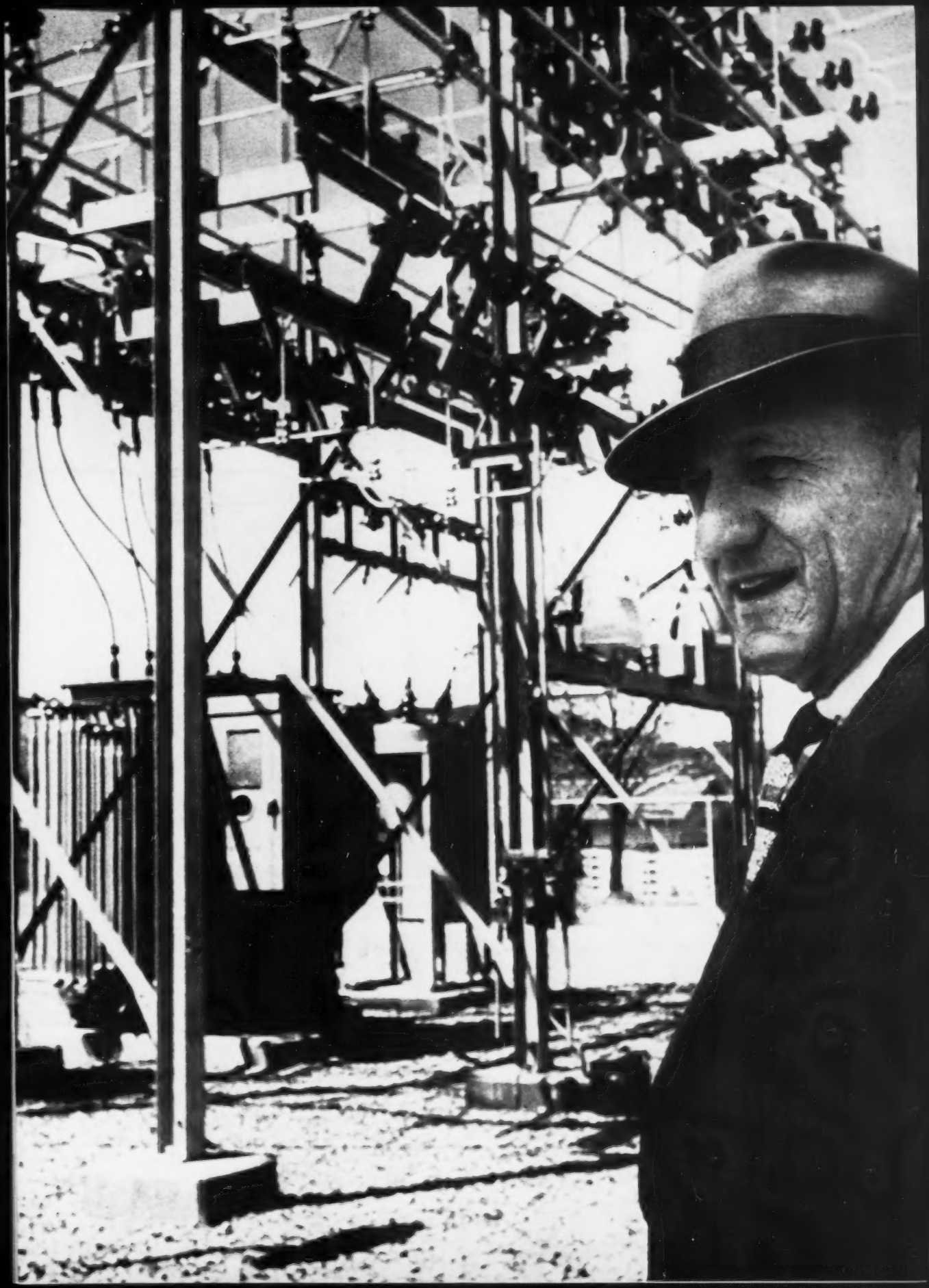


EW

news roundup

PRICES DOWN – General Electric Co. has announced price reductions on its large steam turbine-generator units. W. E. Saupe, general manager of the company's large steam turbine-generator department, stated that the price reduction applies to units rated 200,00 kw and larger as follows:

Rating	Reductions $ per kw
200,000	1.0
250,000	1.5
300,000	2.0
350,000	2.5
400,000	3.0
450,000	3.25
500,000	3.5
600,000	4.0

In addition, Saupe said that the department's contract price adjustment clause has been modified so as to waive the first 2½% increase in prices resulting from present Bureau of Labor Statistics formula each year during the life of each sales contract.

Saupe noted that the turbine-generator price reductions and the revision in the price adjustment clause are the result of engineering design innovations on these larger rated turbine-generator units and improvements in manufacturing techniques.

At the same time General Electric's medium steam turbine, generator and gear department (MSTG &G), Lynn, Mass., and the gas turbine (GT) department, Schenectady, N. Y., have also adjusted the pricing policy on their products so as to waive the first 2½% increase in prices resulting from the present Bureau of Labor Statistics price adjustment formula each year during the life of the sales contract.

The MSTG&G department manufactures steam turbine-generator units ranging from 2,500 kw to 50,000 kw in capacity. The GT department produces combustion gas turbines and gas turbine-generator units with ratings from 6,700 hp and 4,750 kw to 30,400 hp and 21,800 kw.

Price-in-effect contract ceilings for MSTG&G department products are reduced to 10% for shipments within two years, 20% for shipments within three years, and 30% for shipments within four years, except in the case of turbine generator-units up to 22,000 kw when shipment is 12 months or less, prices shall be firm.

Gas turbine department price-in-effect contract ceilings are reduced to 10% for shipments within two years, 20% for shipments two to three years, and 30% for shipments three to four years, except for units rated 10,000 kw or 14,200 hp or under, for which prices shall be firm when scheduled for normal shipment.

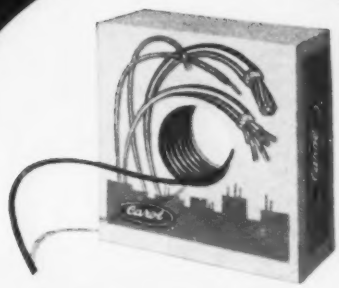
Note: 2½% waiver now applies to all steam turbine-generator units ranging from 2,500 to 600,000 kw.

Ed Taylor, left, and President Robert T. Person of Public Service Co. of Colorado take a spin in the replica of a 1901 Oldsmobile that the company purchased recently. The advertising department purchased the car for use by all divisions and subsidiaries during the "Rush to the Rockies" Colorado Centennial celebration this year. Modern components in the replica include an electric starter and generator and sealed-beam headlights

SHAREHOLDERS – The New York Stock Exchange has made a survey to find out how many people have a share in American industry. The results surprised the Wall Street experts who had estimated the shareholder army in the neighborhood of 10 million. Actually the survey revealed that 12,490,000 people own shares in American industry.

One out of eight adults now has some stock as compared with one out of 12 three years ago. Women outnumber the men only slightly but

Carol 18 and 16 gauge S & SJ wire, portable cord and heater cord . . . one 250 ft. spool per carton. Easier handling, storing, inventory control.



Sturdy, quick-opening, self-dispensing carton for 14, 12 and 10 gauge portable cords. Exclusive Inventory Keeper minimizes waste. 250 feet per carton.

"No-charge" Plywood Reels for 14, 12 and 10 gauge portable cord. 500 or 1000 feet per reel.

Lamp Cord and Thermostat Cord packed four 250 ft. spools per carton. Keeps weight to a practical limit for easier storing and handling. Cartons can be used for reshipment.

Packaging with a Pay-off

Carol *planned* packaging pays off in three ways: (1) Easy-to-read color-coded labeling lets you spot the cable you want at a glance. (2) Extra sturdy, easy stacking, quick opening, self-dispensing. (3) Handy Inventory Keeper minimizes waste.

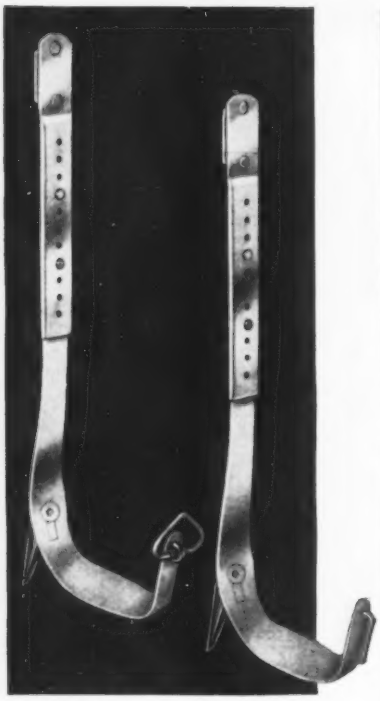
Take advantage of the packaging pay-off you get with top quality Carol Cable.

WHEN YOU CALL FOR CABLE, CALL FOR . . .

Carol®

CAROL CABLE COMPANY
Division of the Crescent Co., Inc., Pawtucket, R.I.

For phone number of closest representative see advertising index in back of book.



No. 1959-AR No. 1958-AR

NEW KLEIN Replaceable Gaff Adjustable Climbers

These new Klein Replaceable Gaff Climbers assure maximum quality and safety. We recommend leg irons be replaced after three sets of gaffs have been used.

The easily replaceable gaff is held in position by a self-locking screw. Full impact is absorbed by the gaff and leg iron. No load is transmitted to the screw.

Adjustable to 14½, 15, 15½, 16, 16½, 17, 17½, 18, 18½ and 19 inches. Made in matched pairs, right and left. Available with triangular ring at ankle or riveted ankle loop. Aluminum finish. Every climber individually tested.

WRITE FOR BULLETIN 559

Bulletin 559, giving full information on Klein Replaceable Gaff Adjustable Climbers, will be sent on request.

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Foreign Distributor: International Standard Electric Corp., New York.

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nearly a third of all shareowners list themselves as housewives. About half of all shareowners are in the $5,000-$10,000 income bracket with an average household income of $7,000. Considering that the American average income is approaching that figure, it looks as though the average American owns a piece of the country's economy.

This large number of "capitalists" may add to the Kremlin's headaches.

—EW—

SUPERHEATED ATOMICS — Atomics International, a division of North American Aviation Inc., announces that the Santa Susana sodium reactor project has topped previous records by producing superheated steam of 1,000 F. In its two-year life as an experimental prototype, the reactor has provided heat for the production of over 15 million kwh, which has been produced in the Southern California Edison Co.'s steam generating plant located adjacent to the reactor.

—EW—

WESTERN BEACON—Soon a 440 million-candlepower beacon will revolve at the top of Denver's Allen Tower Building. Its sponsors say it will be more powerful than a similar beacon on top of the Empire State Building in New York with visibility for the Denver light placed at 250 miles. Unquestionably the new beacon will hold the record for altitude, being mounted on a 19-story building in a mile-high city.

—EW—

SCOREBOARD — The Travelers Insurance Co.'s annual statistics about automobile accidents can provide an interesting conversational piece—with overtones of deadly seriousness.

Well over a third of the traffic deaths occurred on week-ends in 1958. Over three-quarters of the fatalities happened when the car was going straight. An even higher percentage were killed on a clear day when the road was dry.

Still running according to form, heaviest accident time is between 4 p.m. and 1 a.m. with approximately half of the total casualties occurring in this period.

That's the best reason why there should be no letup on the promotion of traffic safety lighting by the electrical industry.

POWER TO DESTROY—A sample of the spendthrift policies of the people's representatives is provided by the state controller of California.

He reports that California has been going in the hole at the rate of $294 a minute for the past nine months and as a result shows a $115 million deficit. The state's current legislature is scratching the bottom of the barrel to find out new ways and means of increasing taxation.

Expenditures for the nine-month period were just under $1 billion with the budget for the next fiscal year approaching a $2 billion level. The live-it-up philosophy very likely will be the hallmark of the 20th century in the annals of future historians.

—EW—

CRACK-IN-THE-WALL? — Investor-owned power companies, heretofore cold toward foreign equipment, may be planning to take a second look.

At least one utility, Florida Power & Light, has invited Swiss and English electrical manufacturers to submit bids for two large steam turbo-generators.

It will be interesting to see how a private utility will evaluate any price differential between the foreign and domestic manufacturers. Contract award is expected within 30 days.

—EW—

England's socialized medicine program offering "free" health service to the British people cost 440 million pounds in its first full year of operation. Last year the cost increased to 705 million pounds or the equivalent of $140 per year for each British family. The Chancellor of the Exchequer has to foot the bill. Where does he get the money?—from the British families. Maybe "free" is not so inexpensive as it sounds.

—EW—

HYDROPONICS — Farm electrification may get another boost in the use of hydroponics for growing forage for cows. Back in the Middle West a number of farmers are finding attractive returns from growing grasses in weather-controlled "greenhouses."

Seeds are sowed in shallow trays of fertilized water. Under the proper conditions of temperature and humidity control, together with certain lighting, they mature to 8-in.

grasses in six days. The grasses are lifted out of the trays, roots and all, and fed to the animals. Higher milk production results.

Maybe this is another glimpse into the future—a future that would be a happy situation for the electrical industry as it would again provide a new and important use of electrical energy on the farm.

—EW—

A U. S. translation of Soviet scientific information reveals that the Russians have developed a new glass that is harder than steel and lighter than aluminum. Its electrical characteristics are better than ceramics and its heat resistance is superior to the best glasses, retaining its hardness up to 1,400 F. It is described as a microcrystalline glass obtained by heat treating with "a special composition" to render its structure monocrystalline.

—EW—

FOR SALE—Any lighting specialists want to buy a lighthouse?

The Tillamook Rock lighthouse has been offered for sale by the General Services Administration. It quit operating about a year and a half ago after being a warning beacon for mariners off the Oregon coast for 60 years.

The 100-ft-high acre of solid rock it stands on, the lighthouse, the keeper's four-bedroom house and a building that houses pumps and generators are all in the package the government wants to sell.

But maybe lighting specialists wouldn't be interested after all.

Among the government's restrictions is "never light the light."

—EW—

TEACHING MACHINE — A new machine called by the name of Electronic Visual-Auditory Training Aid has been developed at the University of Arizona. It consists of a projector which shows 35-mm slides, a tape recorder that provides the necessary accompanying sound, an instrument panel that enables a student or potential trainee to answer questions based on the material presented by the machine.

An analysis tape, on which the student records answers to the material presented, gives the student's answer, the right answer and the time necessary for him to make a decision.

EVATA was developed to help

Put it to the test on your work . . . see for yourself why so many leading contractors and maintenance men insist on Portable Cord and Cable with the familiar and trusted Royal brand. You'll find Royal goes all the way to produce easy-working, long-lasting cord . . . with durable, handy packaging for maximum protection and time-saving workability.

Check your cord and cable stocks, today. See your Wholesaler about Royal Rubber, Neoprene, and Plastic-Jacketed Cords . . . Royal Thermostat Cable . . . Royal Machine Tool Wire . . . Royal Lamp and Fixture Wires . . . and Royal "Powr-Kord" Heavy Duty Extensions. Or write for catalogs, giving wholesaler's name.

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Now...a NEW overhead ground wire

ALUMOWELD™

Aluminum-Covered Steel Wire

Exclusive features—

a **thick cladding** of aluminum

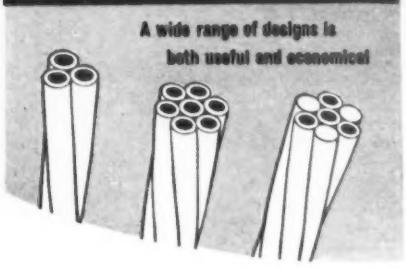
a controlled **atomic weld**

Give your transmission lines permanent protection with the new light-weight, low-cost Alumoweld Overhead Ground Wire—the only aluminum-covered steel wire with a thick cladding of aluminum and the only one made by the controlled atomic-weld process.

Not only does Alumoweld have the strength of steel wire, but because of its 25% by area aluminum covering, it offers the added advantages of much higher conductivity and far greater service life. In fact, Alumoweld has corrosion resistance equal to solid aluminum wire, has one third the conductance, and eight times the strength.

In Alumoweld Overhead Ground Wire, you get three important benefits. (1) Its thick aluminum covering permanently protects the high-strength steel core against corrosion. (2) The electrical conductance is excellent for relaying and for discharging lightning and transient currents to ground. And, (3) Alumoweld's high strength permits stringing for ample mid-span clearance.

For more information on Alumoweld, write today for Engineering Bulletin E.D. 3000.



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For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

For phone number of closest representative see advertising index in back of book.

screen officer personnel for the Signal Corps but the University of Arizona faculty sees great possibilities for the use of similar devices in speeding up teaching processes.

—EW—

HEAT STORAGE – The first step of a heat-storage research aimed at smoothing out the annual load factor of heat pumps and resistance heating systems has been reported by Edison Electric Institute. The project explored several methods of high-temperature storage, the most promising media apparently being the use of salts and refractory oxides. A second method showing some promise is the use of condenser-side storage for the heat pump utilizing the heat of fusion of paraffin waxes.

Complete details of the explorations to date can be obtained from the Joint AEIC-EEI Heat Pump Committee at EEI headquarters in New York.

—EW—

Aluminum towers were selected for a new line for Philadelphia Electric when economic studies showed that the expenses of frequent painting on steel towers would make the latter type of line more costly over the length of life of the line. When the line goes into service in mid-1960, it will be one of the pioneer all-aluminum tower lines in the country.

—EW—

SCHOOL REPORT—Despite charges that the federal government needs to intervene in the educational system, the record since World War II shows that state and local governments have increased the number of teachers by 50%, cut the average number of students per teacher from 28 to 26 and increased the expenditures for public schools, including construction, from $2.9 billion in 1945-46 to $14.4 billion in the current school year. More than 600,000 classrooms have been built in the period.

—EW—

SPACE POWER – Interplanetary space vehicles of the future will receive at least a portion of their power requirements from the sun, according to an announcement by Westinghouse and Boeing engineers. They have completed a 3-lb thermoelectric generator capable of producing 2½ w of power—enough to operate a radio transmitter that would broadcast a strong signal back to earth.

Sun power would be collected in a collapsible reflector that would be closed during the ascent through the dense air and then opened up after the vehicle reaches regions beyond the atmosphere.

—EW—

Consumers Power Co. will build an atomic electric plant on Lake Michigan of 50,000 kw capacity. The plant will be built by Bechtel Corp. as prime contractor with General Electric Co. supplying nuclear and power generating equipment. Since the plant is envisioned as an evolutionary plant, it is Consumers Power's goal to increase the plant's capacity from the initial 50,000 kw to 75,000 kw during a 4½-year period of technical development. The plant will have a four-circulation reactor with external steam separation.

—EW—

COPPER RESERVES—The Department of Interior has estimated the present copper reserves of the U. S. at 32½ million tons—enough to last about 30 years at the present production rate of 1.1 million tons annually.

Between two-thirds and three-fourths of the nation's copper ores average slightly less than 1% metal. U. S. reserves are lower in grade than any other major copper-producing country and another significant fact is the finding that new deposits are not now being discovered at a rate which would maintain the presently known reserves.

—EW—

ANOTHER BURR – Domestic electrical manufacturers, plagued on one side by foreign competition, are being needled on the other by the federal Grand Jury and Tennessee's ubiquitous senator, Kefauver, over the subject on identical bidding. The hassle could develop into an extended antitrust investigation with the over-all effect of a tempest in a teapot.

As one industry executive puts it, in a competitive system it is stupid to publish prices higher than your competitors'. If this is collusion, he continued, the whole country is involved. Cigarettes, gasoline, hairpins and the whole gamut of "shelf merchandise" follow the same competitive pattern.

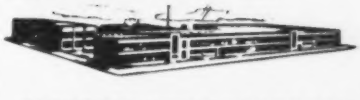
Concrete tight! Every size connector and coupling up to 2". Why settle for ordinary fittings when ETP gives you all this:

- New sparkling Zinc Chromate overplating for lasting permanence. Salt spray tested to retard corrosion.
- Exclusive pre-set, deep-slotted STAKED screws. No backing out for conduit.
- Concrete tight with heaviest gauge wall thickness. U.L. file card E24788.
- Precision bevelled edges with extra heavy duty locknut.
- One piece solid tubular steel—cannot open or spread. Sized for uniformity.
- Available in ½", ¾", 1", 1¼" (one screw type) and 1½" and 2" (two screw type)

CONNECT WITH ETP FOR ECONOMY

WEST COAST REPRESENTATIVES:
WEINGART & LUSTIG
1567 E. 25th Street Los Angeles 11, Calif.
ADams 3-4111

ETP



ELECTRIC TUBE PRODUCTS
74-16 Grand Avenue, Maspeth (N.Y.C.), N. Y.

HOW THE ALUMINUM IN K/W INTERLOCKED ARMOR CABLE SAVES YOU MONEY...SPEEDS YOUR JOB

K/W 3 Conductors Interlocked Armor Cable Spec. 808-S vs. 3 Copper Cdrs. in Steel Conduit
COST AND WEIGHT COMPARISON—1000 FT.

600V RHW 75°C RUBBER 3 Copper Cdrs. in Steel Conduit							600V ALUMINUM INTERLOCKED ARMOR Aluminum Conductors, 90°C, Butyl Insulation						SAVINGS WITH ALUMINUM				
		CONDUIT															
Wire Size	Amps.*	Trade Size In.	O.D. Inches	Area Sq. In.	Total Wt. — Lbs.	Total Cost — $	Wire Size	Amps.**	O.D. Inches	Area Sq. In.	Total Wt. — Lbs.	Total Cost — $	% Bonus Ampacity Alum. over Copper	SAVINGS (1) $	%	Weight Savings Lbs.	Space Savings %
2	115	1¼	1.66	2.17	2,860	903.	1	120	1.44	1.63	850	713.	4.3	190.	27	2,010	25
1	130	1½	1.90	2.82	3,570	1,155.	1/0	135	1.53	1.84	960	806.	3.8	349.	43	2,610	35
1/0	150	2	2.38	4.44	4,660	1,457.	2/0	160	1.63	2.07	1,115	926.	6.7	531.	57	3,545	53
2/0	175	2	2.38	4.44	4,960	1,609.	3/0	180	1.74	2.38	1,285	1,093.	2.9	516.	47	3,675	46
3/0	200	2	2.38	4.44	5,350	1,814.	4/0	205	1.87	2.74	1,550	1,265.	2.5	549.	43	3,800	38
4/0	230	2½	2.88	6.51	7,730	2,508.	250	230	2.04	3.27	1,840	1,522.	0	986.	65	5,890	50
250	255	2½	2.88	6.51	8,190	2,883.	300	255	2.16	3.66	2,080	1,751.	0	1,132.	65	6,110	44
300	285	2½	2.88	6.51	8,700	3,171.	350	285	2.27	4.04	2,325	1,870.	0	1,301.	70	6,375	38
350	310	3	3.50	9.62	10,860	3,752.	400	305	2.37	4.41	2,560	1,998.	–1.6	1,754.	88	8,300	54
400	335	3	3.50	9.62	11,370	4,053.	500	355	2.56	5.14	2,990	2,260.	6.0	1,793.	79	8,380	46
500	380	3	3.50	9.62	12,390	4,748.	600	395	2.79	6.11	3,545	2,615.	3.9	2,133.	82	8,845	36
700	460	3½	4.00	12.57	15,930	6,459.	750	455	3.02	7.16	4,175	3,151.	–1.1	3,308.	105	11,755	43

* Based on 1956 N.E. Code ** 90°C Conductor — 40°C Ambient. Note — Comparison of 75°C RHW and 90°C Butyl K/W Spec. 107. Current prices, 4-29-59.
(1) Savings based on increased cost of copper and steel over aluminum cable. Weights and prices for 1000 ft.

1. LESS COST

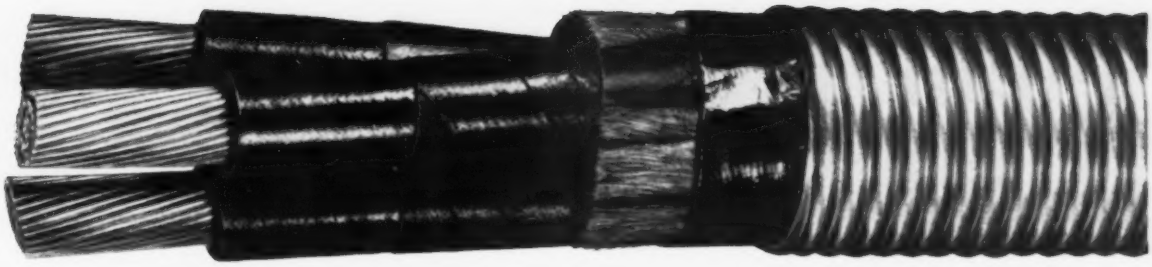
You realize important savings on *materials* with KW Aluminum Interlocked Armor Cable because (1) it gives you greater current-carrying capacity per dollar, (2) the nature of its aluminum armor eliminates costly conduit. Also, you save on *costly labor* because KW's corrosion resistant aluminum armor holds upkeep to a minimum, even in highly corrosive areas.

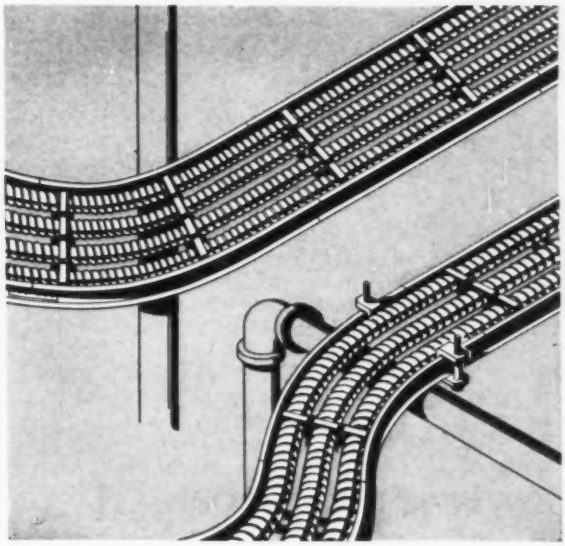
2. LESS WEIGHT

Any interlocked armor weighs far less than heavy, bulky steel conduit. But KW gives you *additional* weight savings because its armor is aluminum—weighing only ⅓ as much as steel or bronze. Moreover, because the conductors are also made of aluminum, they are less than half the weight of copper conductors that carry the same amount of current.

Versatile Use. KW Aluminum Interlocked Armor Cable is the ideal answer for industrial and commercial distribution systems, generator leads and auxiliary cable installations.

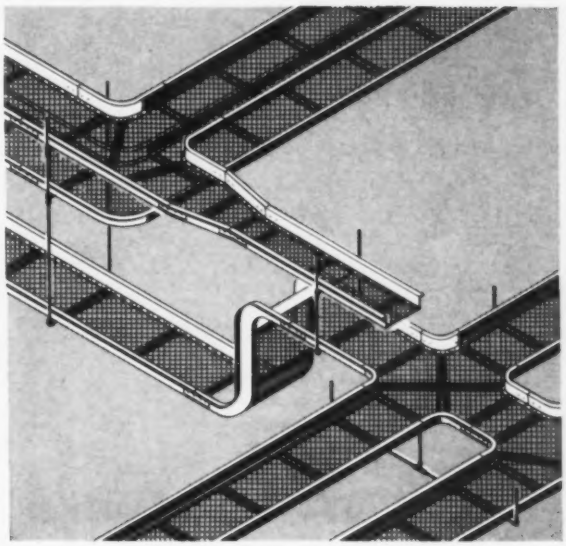
For complete information, call the Kaiser Aluminum sales office or KW distributor listed in your telephone directory. Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, Calif.





3. FASTER INSTALLATION

The light weight and supreme flexibility of KW Aluminum Interlocked Armor Cable mean easier handling, cut installation time in half. It can easily be bent horizontally or vertically around impeding objects and laid in longer lengths, eliminating the need for frequent splicing. In addition, because its diameter is less than conventional conduit systems, compact KW cable can bring space savings of up to 54%.



4. SPEEDIER MODIFICATIONS

KW Aluminum Interlocked Armor Cable may be laid on readily accessible racks, trays and troughs . . . or hung from a messenger. It is a quick and simple matter to expand KW Interlocked Armor Cable systems to meet increased power requirements which may arise after installation.

KAISER ALUMINUM

"If It Carries Current, KW Carries It!"

See "MAVERICK" • Sunday Evenings, ABC-TV Network.
Consult your local TV listing.

For phone number of closest representative see advertising index in back of book.

PRODUCT NEWS

New Designs and Applications

Vacuum Switch Breaker

(1) *Jennings Radio Mfg. Corp., Box 1278, San Jose, Calif.*

This new vacuum switch circuit breaker is said to provide the fastest high voltage overcurrent protection obtainable. Positive interruption at first current zero in a-c circuits limits arc time to less than eight milliseconds. Combined with mechanical operate times of less than two milliseconds the circuit breaker offers 1/8 to one cycle fault current removal. It is composed of a Jennings vacuum switch mounted as a normally open relay actuated by a 115 v d-c solenoid. A 6 v d-c solenoid fired by a 150 v d-c thyratron power supply provides the additional energy required to achieve the extremely fast operating time. The circuit breaker is available with a variety of voltage and current ratings up to 115 v and 4,000 amp interrupting capability. Continuous current ratings are available up to 600 amp rms.

Aluminum Conduit Fittings

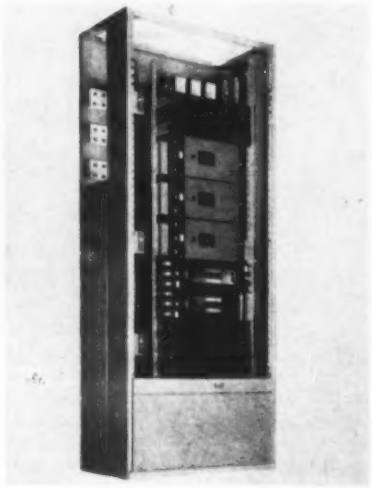
(2) *O. Z. Electrical Mfg. Co. Inc., 252 Bond St., Brooklyn, N. Y.*

A complete line of aluminum fittings has been marketed by this company. Included in the line are cable supports, expansion fittings, end fittings, split couplings, pull box fittings, u bolts, terminators and bushing.

Crimp Connectors

(3) *Penn-Union Electric Corp., Erie, Pa.*

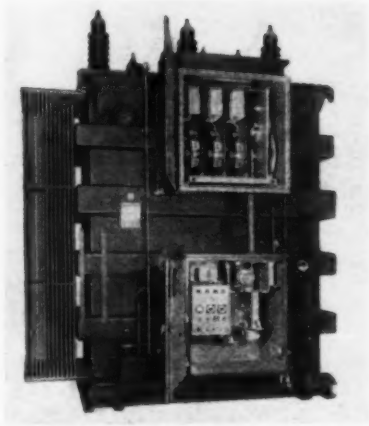
This company has completed its line of crimp connectors to include all sizes from No. 22 to 2 million cm. In addition to all types of lugs, the enlarged line includes parallel and butt splices, pigtails and tags. They are furnished with color coded insulation, with or without insulation grip. Also noninsulated: copper and aluminum.



Vertical Stacked Bus

(4) *Square D Co., 4335 Valley Blvd., Los Angeles 32, Calif.*

Busing is stacked vertically in a new switchboard offered by this company. The bus is moved back and is completely out of the wiring area to provide unobstructed working space and to reduce wiring time. An optional location of the cross bar is possible and the need for bused riser sections to transfer cross busing to a top or bottom location is, in most cases, eliminated.



Mag Amp Control

(5) *Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo.*

These three-phase load tap changing power transformers, with plus or minus 10% voltage regulation in 5/8% steps, use magnetic amplifiers in the voltage sensing circuit to initiate a tap change. Their use is said to result in accuracy of control because the amplifiers can be set to function at precise limits, and in reliability of operation, since they have no moving parts. A single main drive shaft, coupled to the drive motor and to the drive pinion of the transmission assembly, provides direct, positive actuation of the tap changing switches.

Voltmeter

(6) *Western Electro-Mechanical Co. Inc., 300 Broadway, Oakland 7, Calif.*

This manufacturer offers what is called a high line safety voltmeter, which is a portable instrument for measuring high a-c voltages quickly and safely in wet or dry weather. It is reported that the lineman or operator is not exposed at any time to the hazard of high voltage current. The instrument consists of a test prod, a series resistance, indicating head and a ground lead. Any standard hot stick with a tapped head easily attaches to the instrument. It has two scales of 0-5 kv and 0-15 kv that can be read at 8 ft.

A unique feature of Rome's rigid steel conduit

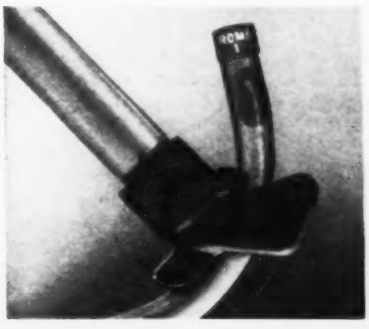
● Blue . . . 1", 2", 3", 4", 5", 6" ● Black . . . ½", 1½", 2½", 3½" ● Red . . . ¾", 1¼"

How you can save up to 20¢ per stub-up with Rome's size-imprinted thread protectors

Do your men cap conduit stubs in the usual but *costly* way?

Do they place a seal over the stub and cap it with a bushing? This is one way of doing the job, but the one or two minutes it takes can cost you up to 20¢ *every time a stub is capped.*

Now Rome's rigid steel conduit comes to you with unique *steel* thread protectors that eliminate capping time altogether.



Rome's color-coded, size-imprinted caps help you save three ways:

1. You can simply bend a stub-up with the Rome thread protector in place, then leave it. No time lost in searching for seals and bushings to protect the conduit from concrete, dirt or stones.
2. Rome's thread protectors are made of *steel* to prevent damage to the threads. They fit snugly enough to stay on the conduit, yet are easily removed without damaging either the threads or the protector itself.
3. You can see the piece of conduit you want at twenty paces. Rome's thread protectors are color-coded to give you easy and immediate size identification and the size is clearly printed both on the top and around the side. No time is lost searching through stacked conduit for a particular size.

These thread protectors are just one of the features that make Rome rigid your best rigid conduit buy. Specify Rome's conduit for your next job. Contact your Rome Cable representative for more information—or write to Department 947-R, Rome Cable Corporation, Rome, New York.

Western Sales Offices

DENVER 3, COLORADO
1160 Elati Street
(Tel. Keystone 4-0533)

SALT LAKE CITY 1, UTAH
230 South 4th West
(Tel. Elgin 9-8811)

LOS ANGELES 22, CAL.
2510 South Malt Avenue
(Tel. Raymond 3-3631)

SAN FRANCISCO 24, CAL.
1100 Selby Street
(Tel. Valencia 6-3580)

PORTLAND 5, OREGON
1224 S. W. Morrison St.
(Tel. Capitol 2-5470)

SEATTLE 4, WASHINGTON
3430 Fourth Avenue, So.
(Tel. Main 4-3017)

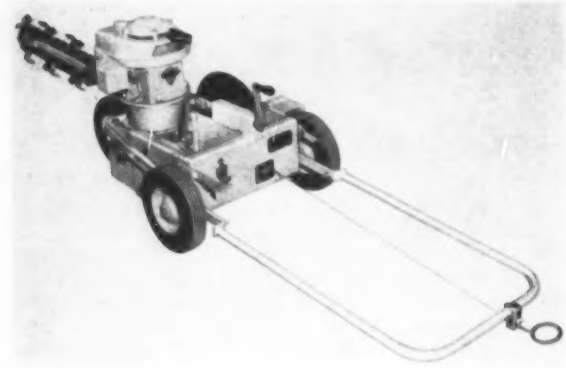
ROME CABLE
CORPORATION

For phone number of closest representative see advertising index in back of book.

Forced-Air Electric Furnace

(7) *Wesco Furnace Division, Northwest Foundry & Furnace Co., 2345 S. E. Gladstone St., Portland 2, Ore.*

A central, forced air, electric furnace with sufficient heating capacity for the average three-bedroom home has been placed on the market by this company. Key to engineering of the unit is development of an energy control system to prevent overloading of transformer equipment, according to W. R. Pindell, vice-president and general manager (see picture). The furnace will be manufactured in three sizes, delivering 34,150, 51,225 and 68,300 Btu. It can be placed in an attic, in floor crawl space or suspended from the basement ceiling. Outside air, humidity control and air filtering are included in the system. Electronic air cleaners and refrigeration coils for air conditioning can be installed in the system.



Self-Propelled Trencher

(8) *Davis Mfg Inc., 1301 S. Handley, Wichita, Kan.*

A new portable, self-propelled utility trencher offered by this company is designed for installation of underground electrical systems. The unit digs trenches from 2 in. to 3 in. wide and to depths of 3 ft. After it has been started, no operator is needed except for casual observation and to stop the unit. It has a positive, variable-speed drive with a winching mechanism that draws it down the line to be trenched. Six different speed settings as well as a neutral and stop-forward motion are controlled by a single lever. Available with both gasoline and electric power.

Electronic SRT Transformer

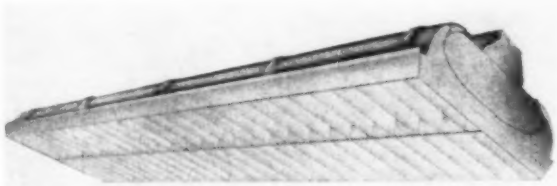
(9) *Line Material Industries, 700 W. Michigan, Milwaukee 1, Wis.*

Development of an electronically controlled self-regulating distribution transformer has been completed by this company. The new SRT supplements the hydraulically controlled unit announced last June. Operating characteristics of the two types of transformers are identical. They sense voltage at the utilization level and maintain secondary voltage in a 3½-v band width about a preset value between 120 and 126 v. The new unit has a sensing unit consisting of encapsulated, miniaturized, solid state, electronic components housed in a metal container. A convenient plug and receptacle permits external mounting of the control on the transformer and facilitates exchange of controls. Each sensing unit is factory calibrated for a specific midpoint setting. Power consumption of the sensing unit and tap changer is 12 w.

Service Drop Bracket

(10) *Malleable Iron Fittings Co., Branford, Conn.*

A new line of house brackets for attaching service drops to the house is offered by this company. Models are available for attachment to brick, concrete, metal or wood surfaces and will accept all types of dead-ending devices. The brackets are malleable iron, hot dip galvanized for corrosion resistance. Specifications and price information are available on request.



Louvered Industrial Fixtures

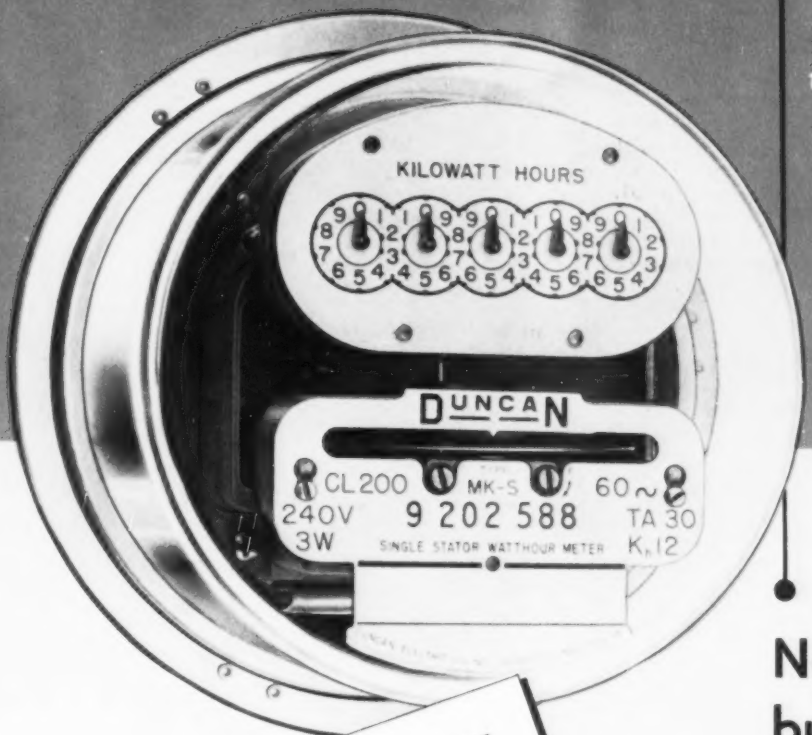
(11) *Curtis-AllBrite Lighting Inc., 325 Shaw Rd., South San Francisco, Calif.*

Designed to provide comfortable shielding with the exceptionally high levels of light made possible by advanced fluorescent lamps, this line of industrial fixtures is designed for all of the new high output lamps. The louver is a 30x30° baffle type, all steel design, finished in baked white enamel. Each 4-ft louver section is locked with captive fasteners. Servicing is by dropping louvers on permanent safety chains. Mounting is by stems, chains or on surface.

For More Information Use Coupon . . . Page 28

MORE CAPACITY *Per Dollar!*

Class 200 Ratings *for More Housepower!*



Now your dollar buys more Metering Capacity!

DUNCAN

Concentrates on Metering Equipment —the attention of the entire Duncan Organization is devoted to your metering requirements.

"Thinking Ahead . . . Moving Ahead . . . to stay Ahead of Demand!"

TYPE MK— SINGLE PHASE METERS

are available in three classes: 10, 100, and 200

The class of each represents the maximum current for each rating, i.e., 10 amps., 100 amps., and 200 amps. They represent the latest carefully engineered product in a long line of Duncan developments and are built to accurately meter a wide range of loads from a few watts to a full 200 ampere. The damping magnet system is composed of two high energy Alnico magnets positioned above and below the disc, which provide calibration stability and substantial freedom from tilt error. Arc-resistant insulation and self-contained arc gaps to by-pass electrical disturbances protect the MK from insulation failures.

Simplification of design provides for a minimum number of parts —improving reliability—reducing necessity for repairs—but making any maintenance convenient. A three position cover ring, separate worm wheel with mesh independent of the register, and adjustments operated from the front, make this "Meterman's Meter" convenient to calibrate and maintain.

MEET INCREASING LOADS

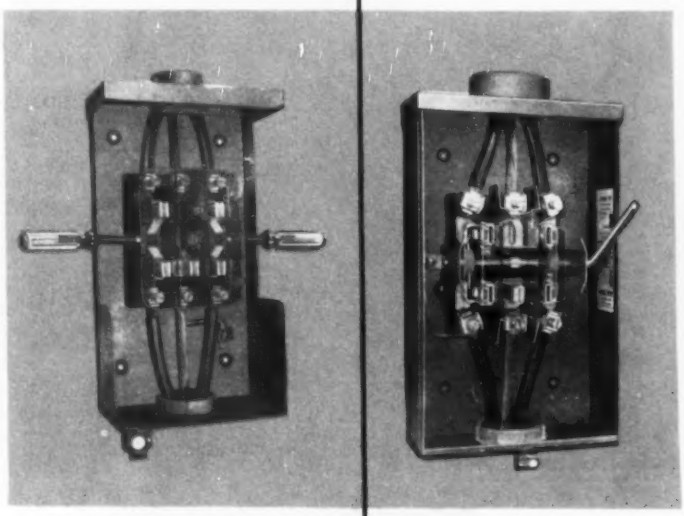
With Extended Range Single phase meters and Mounting Devices with 200 Amp. Capacity

HQ-5 *(Below)*

For Commercial or "High load factor loads" up to 200 Amp. capacity

MD-5

For residential or "low load factor loads" up to 200 Amp. capacity



LIVE BETTER ELECTRICALLY WITH FULL HOUSEPOWER

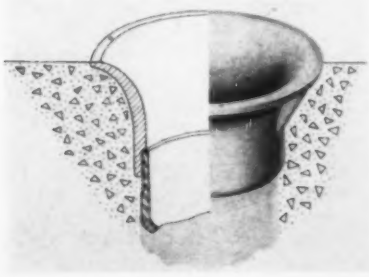
DUNCAN ELECTRIC CO., INC.

Lafayette, Indiana.

Dielectric Test Set

(12) *James G. Biddle Co.*, 1316 *Arch St., Philadelphia 7, Pa.*

This company announces the availability of two new dielectric test sets. One is a portable (pictured) and the second a bench model. Maximum output current is 5 ma at output voltage up to 2.5 kv for step-voltage resistance tests, voltage withstand, breakdown and 1-minute resistance tests on insulation in electrical equipment with voltage ratings in the 300-, 600- and 2,500-v classes. The testing equipment is designed for use with such equipment as rotating electrical machinery, dry-type transformers, switchgear, capacitors and insulators rated 230, 440, 550 and 2,500 v a-c and d-c, traction motors and generators rated 600 v.



Conduit End Bell

(13) *O. Z. Electrical Mfg. Co., Inc., Brooklyn 17, N. Y.*

A newly designed end bell for use on threaded conduit is available from this company. It is used to provide a smooth, rounded pulling surface to prevent damage to cable sheath or insulation during the pulling operation. The standard end bell is of cast aluminum, and will accommodate conduit ranging from 1½ in. to 5 in. Bronze fittings are also available.

UTILITY BODY OAKLAND

SERIES CC
CREW COMPANY BODIES

Utility Body Company's Series CC Line Construction Body provides the ultimate in safety, comfort and warmth for your line crew. This body is unparalleled for its straight line modern design and provides clean and completely protected transportation facilities. Every inch of space is utilized for greater efficiency. Your line crews have absolute assurance that this Body, its compartment layouts, as well as complementary hydraulic derricks and other equipment represent the most effective tools of their nature on the market today.

COMPLETE LINE

The complete Utility Body Line is a sign of progress...matching perfect quality with functional design. With the know-how to meet and fulfill each and every customer's specific requirements...UTILITY BODY COMPANY has engineering and plant capacity to expedite immediate delivery of all special and standard units.

There IS a UTILITY BODY to fulfill YOUR OWN Specific Requirements!!! Contact UTILITY BODY COMPANY for data on the SERIES CC CREW CAB LINE BODIES or telephone your nearest distributor for complete information on UTILITY BODIES.

MODEL UED-2 DERRICK 26' to 30' 8" HEIGHT

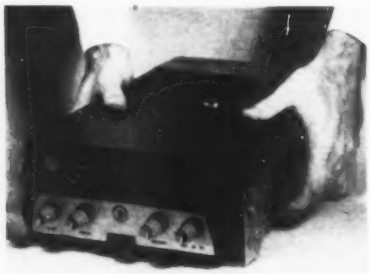
MODEL CC-147C BODY

UTILITY BODY CO.
1530 WOOD STREET
OAKLAND 7, CALIFORNIA
TWinoaks 3-8980

Aerial Ladders

(14) *Truck Equipment Co., 3963 Walnut St., Denver 5, Colo.*

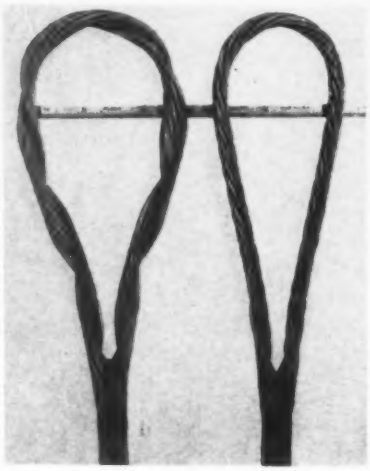
A new line of aerial ladders has been developed by this manufacturer. Features include upper ladder section handrails built into fiber glass to insulate workers from high-voltage contact, a tri-plane basket to give workers a flat surface regardless of ladder angle, a check valve in the hydraulic raise system to slow descent of the ladder if the hydraulic system is damaged and ladder heights from 24 to 45 ft. Three series in the new line include a manual operated hydraulic electric operation and a fully powered model. All three can be mounted on standard truck chassis.



Transistorized Radio

(15) *General Electric Co., Communication Products Department, Box 4197, Lynchburg, Va.*

General Electric Co. unveiled an advance design of transistorized two-way radio equipment at a meeting of the National Committee on Utilities Radio in Denver recently. Now on the market, the equipment is said to contain the highest powered transistorized models and the smallest sizes to be made commercially available to utility users. Units are available in power outputs up to 75 w. There are 30- and 10-w models in sizes as follows: 8⅝ in. wide, 12 in. long and 4 in. high. Only three tubes are used in lower wattage categories and four in 30- and 75-w models. A major advantage is low battery drain.



Loop Dead-End

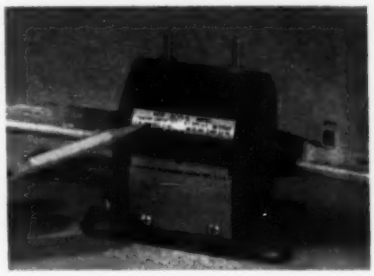
(16) *Preformed Line Products Co., 5349 St. Clair Ave., Cleveland 3, Ohio*

A new cabled loop guy grip dead-end with smoother contouring and decreased dimensions of the loop has been developed by this company. It is said to be more durable, and to have greater abrasion resistance. Smoother contouring permits the bend of the loop to be better seated in the groove of the hardware. Dead-ends are available for use at the top, breaker and anchor rod in 5/16, ⅜, 7/16 and ½ in. diameter sizes.

Static Relay

(17) *General Electric Co., Schenectady 5, N. Y.*

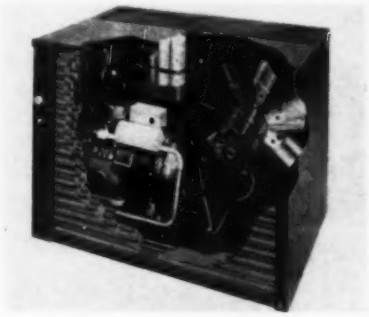
A new static protective relay with faster operating speeds than conventional electromechanical designs is offered by this company. The static phase comparison relay is the first in the company's new line for wide application in the protection of high voltage transmission lines and power system components. It operates within one and a half cycles. Designed for use with the company's new transistorized carrier-current equipment, the relay provides high-speed simultaneous tripping of transmission line breakers for all internal faults by comparing phase relationships of currents entering and leaving a line section.



Current Transformer

(18) *Westinghouse Electric Corp., Box 2099, Pittsburgh 36, Pa.*

A new current transformer for indoor use by utilities and low voltage metering applications is available from this company. It is reported that a savings of one-third can result in indoor applications where more expensive weather resistant molded transformers are not required. It is designed for 600-v service, and can be supplied in current ratings of 200/5 or 400/5 amp. Both ratings are within the 0.3 accuracy class, and they are said to meet all ASA standards.



Electric Air Conditioner

(19) *Bryant Mfg. Co., 2020 Montcalm St., Indianapolis 7, Ind.*

This company is offering a new air cooled electric air conditioner with features that increase its capacity from 10 to 14% without increasing power consumption. Featured is the

Now . . . for your Medallion Homes

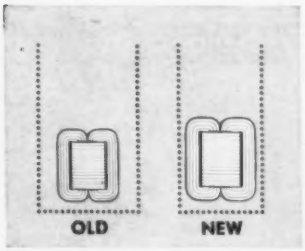
KUHLMAN *Perma-Gold* TRANSFORMER

looks good as gold . . . and is!

The Kuhlman "Perma-Gold" Transformer, designed to serve your Medallion Homes, will add real distinction to your "showcase" neighborhoods and developments.

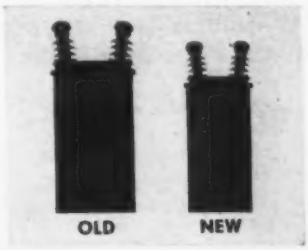
This distinctive Kuhlman transformer, with its gleaming gold color, spells prestige for the utility, for the builder and developer of the all-electric neighborhood, and for the people who live in the Medallion Homes the transformer serves.

Kuhlman "Perma-Gold" Transformer, available in conventional or CSP pole-type ratings, is a symbol of the great achievements of the electrical industry, and a symbol of Kuhlman's own achievements in transformer design and efficiency.



BIGGER INSIDE

New design allows Kuhlman to build a larger core and coil, using more copper and steel. This provides improved impedance, lower losses, and better regulation.



SMALLER OUTSIDE

Shorter, slimmer tank takes up less room on the pole. Small size offsets increased weight of stepped-up core and coil.

Ask your Kuhlman representative to give you all the facts about how the Kuhlman "Perma-Gold" Transformer will build the prestige of your all-electric communities.

KUHLMAN ELECTRIC COMPANY
65th year
the year you get more for your transformer dollars

KUHLMAN TRANSFORMERS

KUHLMAN ELECTRIC COMPANY, Birmingham, Michigan

Manufacturers of transformers since 1894

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Gentlemen:
I am interested in how Truco can solve my stringing and reconductoring problems. Please send your Tensioning Brochure *today*.
Name
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Pulls and Tensions FOUR Conductors Simultaneously
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Saves More Than 75% in Labor Costs
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Saves More Than 75% of Initial Equipment Costs
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Uses ONE Puller and ONE Tensioner to do the Complete Stringing and Reconductoring Job
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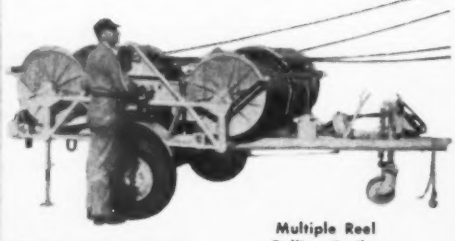
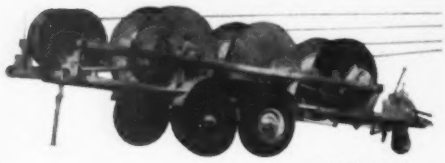
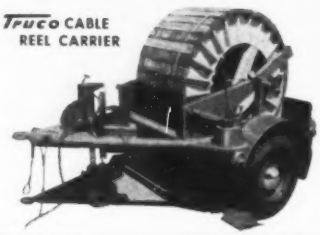

Multiple Reel Pulling Trailer

NEW TENSIONING EQUIPMENT


Multiple Reel Stringing Trailer

Complete utility and maintenance hydraulic equipment

Truco AERIAL LADDER

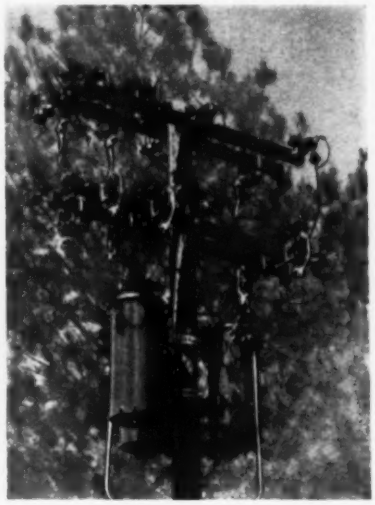
Truco CABLE REEL CARRIER


Truco AERIAL LIFT

Truco DERRICK

Write or phone for full details
Truco
Ask for name of nearest distributor
TRUCK Equipment COMPANY
2962 WALNUT ST • AComa 2-7905 • DENVER 5, COLORADO

use of a liquid indicator to measure the amount of refrigerant in the condenser coil to assure the right amount of charge at all times. Both high and low pressure switches are used as standard equipment to protect the compressor and electrical components against excessive loads. A blower is rubber mounted for quiet operation and uses no pulleys or belts. The blower design changes the air flow from horizontal to vertical, discharging hot air through an ornamental top grill. A two-in-one condenser coil is said to be responsible for the big increase in efficiency and lower operating cost.



Cluster Mounted Regulators

(20) *General Electric Co., Pittsfield, Mass.*

Three single-phase step voltage regulators mounted on the same pole have been found economical for voltage control in residential areas according to this company. Cluster mounting reduces a number of equipment carrying poles and is said to simplify installation and maintenance. Total weight of three regulators is 3,390 lb, but spaced 90 degrees apart, bending moment on the pole is reduced considerably. Control cabinets are mounted at the base of the pole.

For manufacturer's bulletins with additional information on these products, fill in coupon on page 26.

Thermoelectric Heat Kit

(21) *Minnesota Mining and Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.*

A test kit designed to introduce the fundamentals of thermoelectric heat pump operations and to further experimentation on possible heat pump applications is announced by this company. The kit contains an assembled heat pump, four extra "p" type elements and four extra "n" type elements. A manual of data accompanying the kit contains instructions for the use of the kit and suggested experiments, as well as an explanation of thermoelectric heat pumping and construction suggestions for heat pumps of the operator's own design.

Bus-Enclosed Switch

(22) *I-T-E Circuit Breaker Co., 1900 Hamilton St., Philadelphia 30, Pa.*

A high-voltage switch that is completely enclosed in a section of isolated-phase bus is a space saving new development offered by this company. Designed for use with runs of isolated-phase bus, the metal enclosed high voltage switch will find use where space for expansion is at a premium. The company reports that metal enclosed switching stations can be built on as little as one half the space required for open switchyards. Space savings of as much as 4,000 sq ft are possible for typical stations.

For manufacturer's bulletins with additional information on these products, fill in coupon on page 26.

For street lighting . . . from 120 V multiple to 10,000 V series . . .

use cost-saving SUPERIOR CABLES

Thermoplastic Series Lighting Cables

- High resistance to earth acids and alkalis
- High resistance to sunlight, moisture, weather
- Small diameter, lightweight
- Easy to splice

Figure 8 Pole and Bracket Cable

- High resistance to abrasion, mechanical damage
- Does not deteriorate with age or weather
- Will not support combustion
- Flexible, strips clean, speeds installation

SUPERIOR CABLES are quality-engineered, precision manufactured and thoroughly tested.

With these plastic insulated and jacketed cables, performance and economy go hand in hand.

For low initial cost . . . for less maintenance cost . . . order SUPERIOR CABLES!

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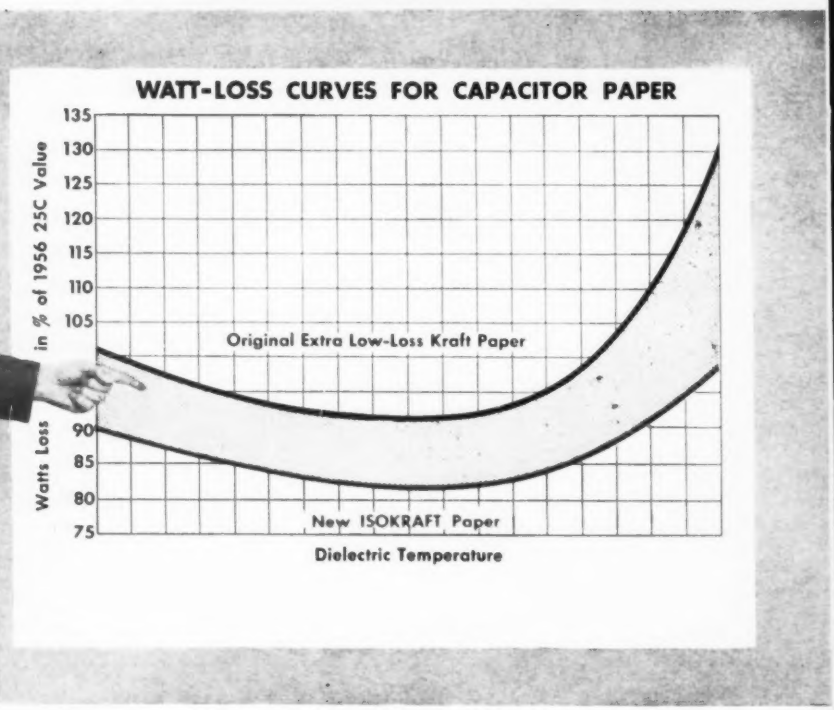
GENERAL ELECTRIC ANNOUNCES...

NEW "ISOKRAFT 50"



NEW ISOKRAFT† PAPER WITH GREATER DIELECTRIC STRENGTH . . . multiplies G-E capacitor benefits through improved electrical characteristics. R. J. Hopkins, Manager of Power Capacitor Engineering, points to loss reduction, which is greatest at higher temperatures. Result: greater thermal stability, longer, more reliable capacitor life for "ISOKRAFT 50" capacitors. ISOKRAFT paper is covered by patent No. 2505545.

**14 percent lighter than previous General Electric units*

†*Trade-mark of the General Electric Co.*

W CAPACITORS

- **LONGER LIFE—**
  through 20% lower temperature rise
- **MORE RELIABLE—**
  because of greater thermal stability
- **EASIER TO INSTALL—**
  with 14% weight reduction

General Electric's new ISOKRAFT[1] paper dielectric, with other manufacturing and design improvements, now gives you smaller 50-kvar capacitors with greater reliability, longer life, easier installation.

LONGER LIFE—20% lower temperature rise permits cooler operation, lengthens capacitor operating life.

GREATER RELIABILITY—ISOKRAFT paper has a superior loss-versus-temperature characteristic (see chart left). The result is a more thermally stable unit.

EASIER TO INSTALL—14% reduction in weight and smaller size make installation faster, easier, permits more kilovars per pole: 600-kvar equipments replace 450-kvar equipments, with no weight increase.

FOR COMPLETE INFORMATION on "ISOKRAFT 50" capacitors, write for bulletin GEA-6990—Section 445-27, General Electric Co., Schenectady, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For phone number of closest representative see advertising index in back of book.

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- Kaiser Aluminum & Chemical Sales, Incorporated
  (INSULATED ELECTRICAL WIRE PRODUCTS AND ALUMINUM CONDUIT)
- Hughes Aircraft Company
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- Lapp Insulator Co., Inc.
- Preformed Line Products Company
- Lotran, Inc.

3450 Wilshire Blvd., Los Angeles 5, Calif.
Phone: DU 1-3951 · TWX: LA-795

BULLETINS ETC.

(23) **MOBILE EQUIPMENT**—The entire product directory of Truck Equipment Co., 3963 Walnut St., Denver 5, Colo., is now available in an indexed catalog. The company makes various types of aerial equipment, derricks, diggers, etc.

(24) **ELECTRICAL DISTRIBUTION**—A new 68-page catalog of Murray Mfg. Corp.'s electrical distribution equipment has been issued. Complete descriptions, buying and design specifications are included. Write to the company at 1250 Atlantic Ave., Brooklyn 16, N. Y.

(25) **WIRING DATA**—Informative data on wiring and wiring system standards for industrial use are now in bulletin form and available from Rome Cable Corp., Rome, N. Y. It is a technical paper presented before the Commercial and Industrial Wiring Conference of the Pacific Coast Electrical Assn. Ask for Rome Technical Bulletin RCT-102.

(26) **METER GUIDE**—Bulletin GEC-1400B, published by General Electric Co., Schenectady 5, N. Y., provides up-to-date information on the company's line of single-phase and polyphase watt-hour meters, watt-hour demand meters, meter sockets and water heater time switches. This is the 1959 edition of the buyers' guide.

(27) **TEACHING AIDS**—Teaching aids for electrical and electronic measurements, available from Weston Instruments Division of Daystrom Inc., are described in a folder now available. The aids are available free. Write to Daystrom-Weston Sales Division, 614 Frelinghuysen Ave., Newark 12, N. J. Ask for S-18.

(28) **NEW CABLE**—Publication of a new 32-page catalog on its Butyl cable is announced by Anaconda Wire & Cable Co., Department EFL, 25 Broadway, New York 4, N. Y. Ask for Catalog No. 102. Information on design features, insulations available and performance highlights are carried in the publication.

(29) **FURNACE CONTROL**—Diagrammatic and schematic drawings are used to show a furnace combustion control system offered by Bailey Meter Co., 1050 Ivanhoe Road, Cleveland 10, Ohio. Included also are detailed descriptions of system operation and a list of installations. Ask for Bulletin 514.

(30) **PHOTOELECTRIC CONTROL**—Bulletin GEA-6822, 16 pages, describes General Electric's full line of easy-to-use controls for virtually every industrial counting, sorting, signaling, protecting, diverting, detecting or limiting job. The bulletin illustrates how various devices can be applied to simplify systems, reduce labor and waste. Write to the company at Schenectady 5, N. Y.

(31) **FLUORESCENT LIGHTING**—A 20-page catalog, detailing complete price and ordering information on all Smithcraft recessed fluorescent lighting equipment, has been released by Smithcraft Lighting, Chelsea 50, Mass.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after October 1

Please send me, without obligation, the new product information or catalogs

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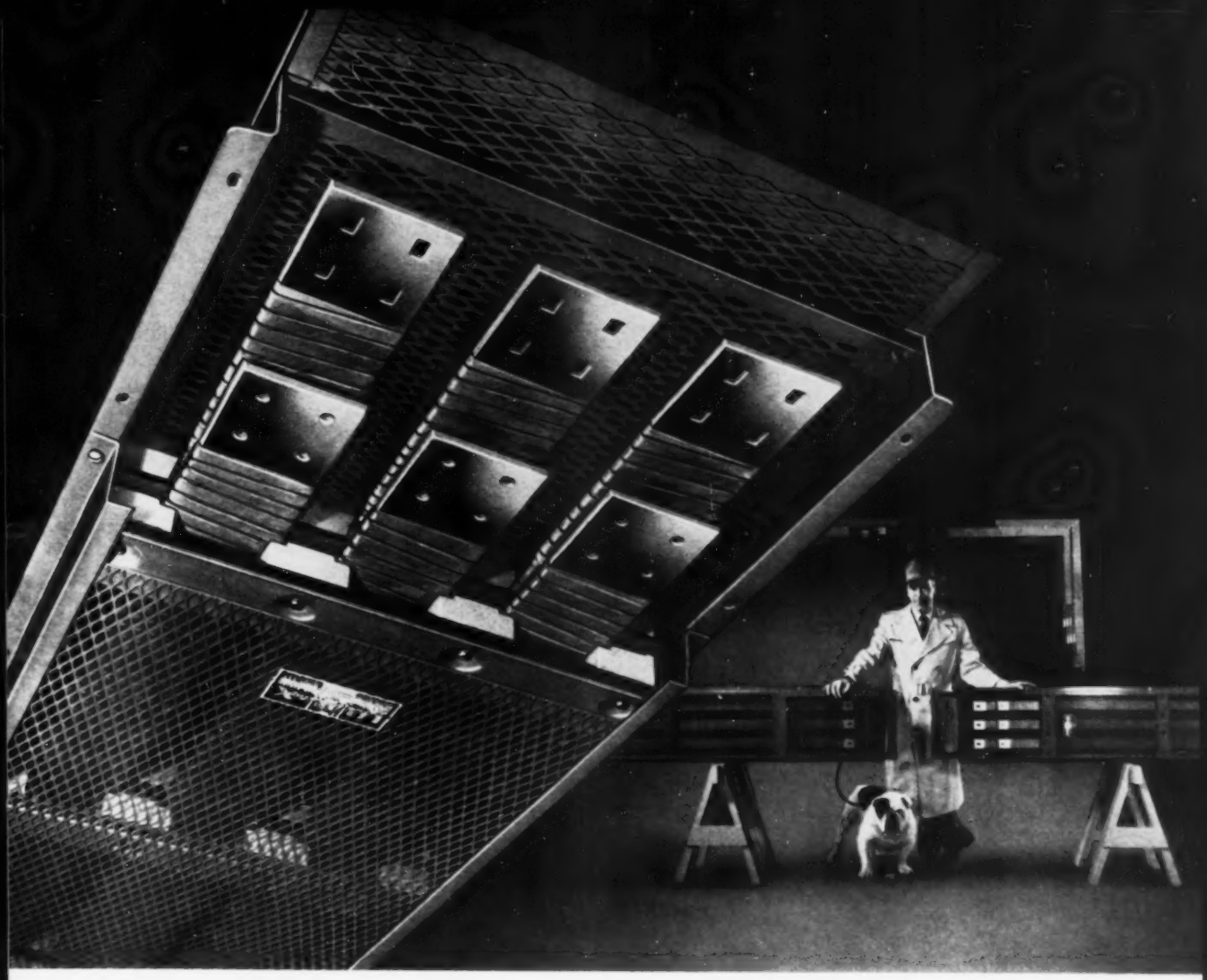
*Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.



"PAIRED PHASING" HELPS YOU MEET THE LOAD . . . WITH POWER TO SPARE

Lo-X Bus Duct assures lower balanced voltage drop . . . extra current carrying capacity

Increase your safety margin against unexpected power fluctuations! BullDog BUStribution®—using a paired phased arrangement of aluminum bus bars—neutralizes magnetic fields, assures uniform balanced current distribution and low voltage drop. Exclusive "paired phasing" acts to distribute current equally throughout the cross-sectional area of each conductor . . . balances current among all conductors . . . reduces impedance to a minimum. Full use of the conductor material assures extra capacity, allowing the LO-X feeder system to operate at top efficiency.

And LO-X offers these additional operating advantages. The duct has no moving parts . . . thus nothing to wear. It is prefabricated . . . adapts to any building contour. Exclusive scarf-lap joints assure rigid connections . . . speedy installation. BullDog's five-step silvering process of aluminum bus bars guarantees maximum conductivity at connection points. Special spring-type cup washers at the joints give a positive *bolted* connection.

For a distribution system that guarantees top performance and long, continuous service settle on *Bus Duct by BullDog* . . . it will readily adapt to your client's changing power needs.

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I-T-E CIRCUIT BREAKER COMPANY
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Consult the following Pacific Coast representatives:

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Young Electric & Mfg. Co.
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Safety Switchboard Company
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Oakland 21, California

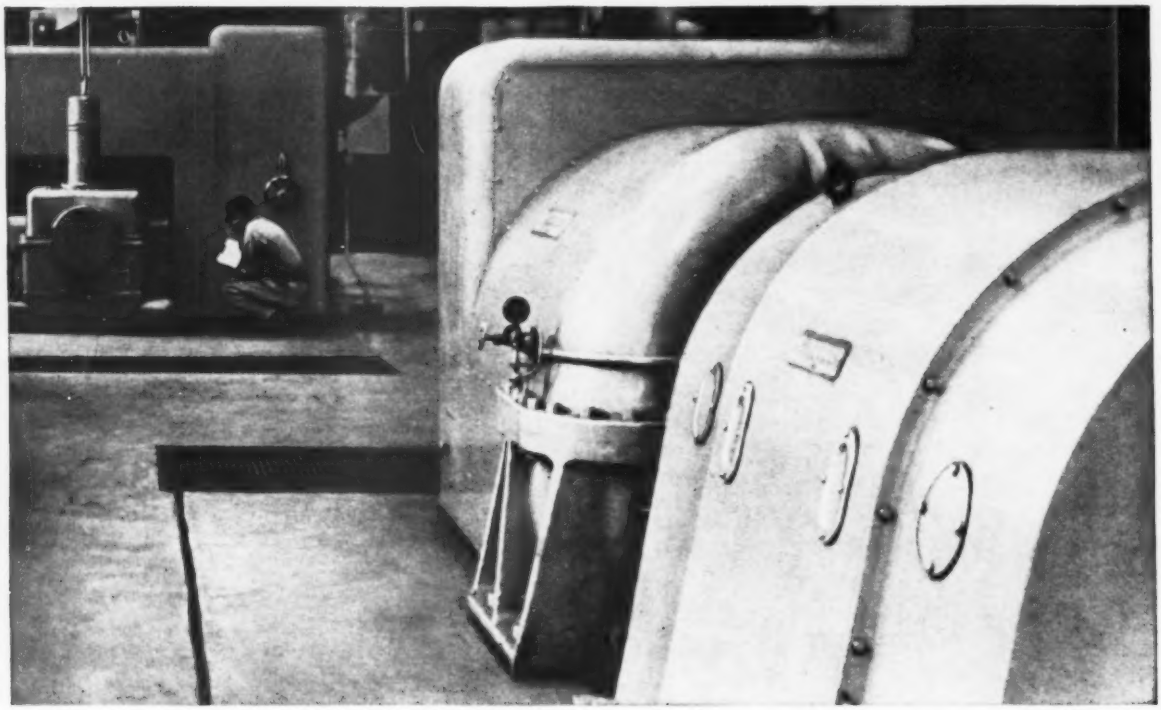
BullDog Elec. Prod. Co. of Los Angeles
2885 E. Washington Blvd.
Los Angeles 23, California

STANDARD ENGINEER'S FIELD REPORT

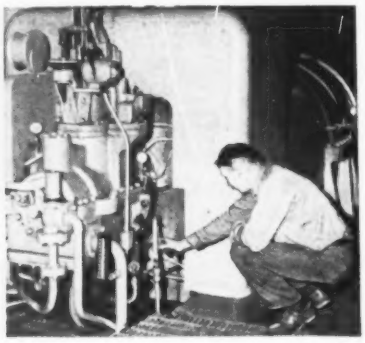
PRODUCT **CHEVRON OC TURBINE OIL**

FIRM **Southern Utah Power Co. Cedar City, Utah**

After 70,918 hours, Oil Neutralization No. only .01!

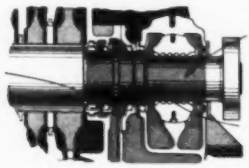


Latest analysis of Chevron OC Turbine Oil in these two Westinghouse steam turbines at Southern Utah Power Co. shows oil to be in virtually new condition. Neutralization number was just .01, and all other characteristics measured were equally satisfactory. At time of sampling, 2,500 KW turbine (in foreground) had run 70,918 hours, 5,000 KW unit (at rear) 31,670 hours. Neither unit has required sweetening since initial charge of Chevron OC Turbine Oil (formerly called Calol OC Turbine Oil).



Steam Plant Superintendent Ralph Jones (left) explains how changes in load automatically control boiler's induced draft fan through this fluid coupling. Chevron OC Turbine Oil has given excellent service as hydraulic fluid in this coupling. At right, Mr. Jones checks oil temperature on smaller turbine. This unit went into service in 1945, the larger one in 1951.

Why Chevron OC Turbine Oil prevents sludging, rusting and wear



- Excellent metal wetting ability keeps oil on bearings and gears under heaviest loads
- Oxidation inhibitor prevents sludge, gum and lacquer formations
- Corrosion inhibitor prevents rusting

For More Information contact your Standard Engineer or Representative, or write 225 Bush Street, San Francisco 20, California

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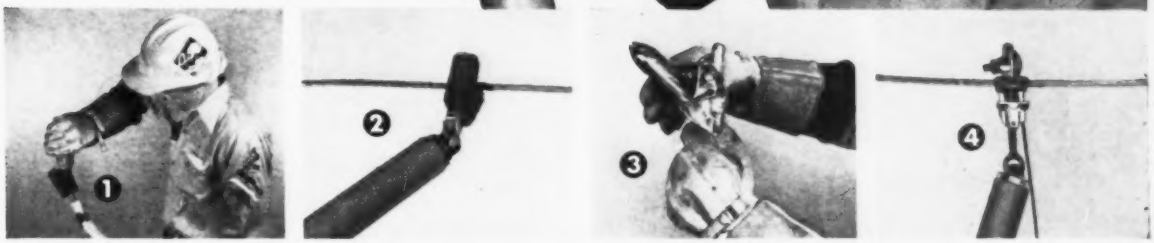
STANDARD OIL COMPANY OF CALIFORNIA

Here's the clamp to use for Hot Line Taps...

"I've worked with hot stick crews in many parts of the world and I've seen quite a bit of conductor damage due to poor connections. You can take my word for it, Chance PC Hot Line Clamps have what it takes to protect these important spots on your circuits. They have extra-wide jaws that are easy on the conductor and contact all outside strands... they can take thermal expansion and contraction and still hold tight... and they'll never 'freeze' on the line."

O. G. (Andy) Anderson
Product Manager, Tools—A. B. Chance Co.



...and here's the way to get a lineman's cooperation in making trouble-free connections

Make it as easy as possible to apply clamps with **z.l.n. 100** by buying Chance clamps packaged with this *Contact Aid* pre-applied. Our engineering research and our experience with many utilities has taught us that Chance **z.l.n. 100** *Electrical Contact Aid* and a wire brush are the first requirements in making a long-lasting hot line tap. 1. Apply **z.l.n. 100** *Contact Aid* to the conductor cleaning brush. 2. Wire brush the contact area of the conductor to remove surface oxides and to apply the corrosion inhibiting *Contact Aid*. 3. Remove the plastic package from a Chance "Protected Connection" Clamp—(the *Contact Aid* is pre-applied to a factory-clean clamp). 4. Install the clamp—It's specially engineered for hot line taps that will let you give your customers continuous electrical service without danger of burn-downs and allow you to easily remove the service if necessary.

Chance "Protected Connection" Type PC Clamps are available in a complete range of sizes that can take from No. 6 ACSR to 1,431 MCM ACSR and comparable sizes of copper conductor. There's a type for every contact combination—including the Chance AGP with heavy fortified cadmium coating for additional protection on bimetal connections.

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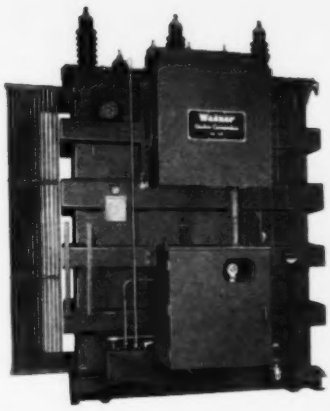
WAGNER LOAD TAP CHANGING TRANSFORMERS

offer new simplicity of design . . . new quietness of operation . . . new freedom from maintenance



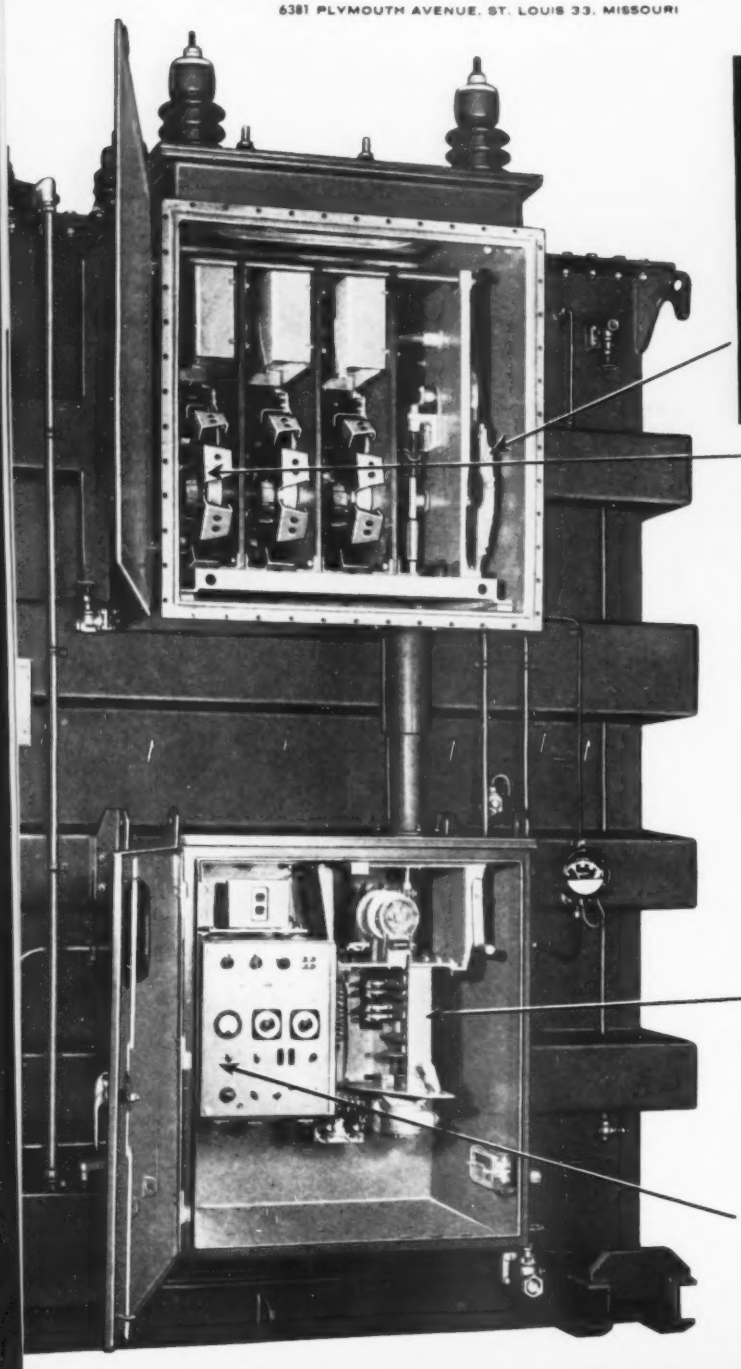
Here is a compact, extremely simple power transformer load tap changing mechanism, using a single drive shaft and one set of miter gears to assure quiet operation. Magnetic amplifier control means higher accuracy in the voltage sensing circuit, and greater reliability since no moving parts are necessary.

The design simplicity of the Wagner load tap changer . . . in the drive mechanism, the transmission assembly, the switches and the control circuit . . . results in long, efficient operating life with freedom from maintenance.

For full information on these Load Tap Changing Power Transformers, consult your nearby Wagner Sales Engineer. There are Wagner branches in 32 principal cities.

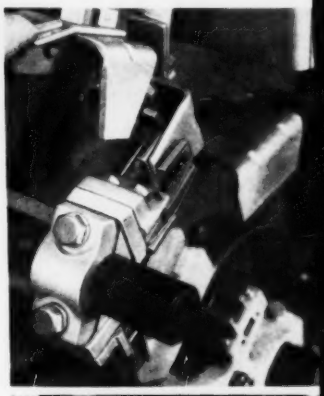
Wagner Electric Corporation

6381 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI



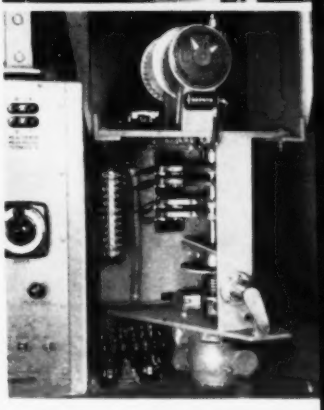
ONLY 2 GENEVA GEARS

The two Geneva gears operate from a single drive pinion, and are designed for 90° entrance to reduce noise of operation. The reversing switch operates from a cam in the face of the tap selector gear which has a positive mechanical stop to prevent overtravel.



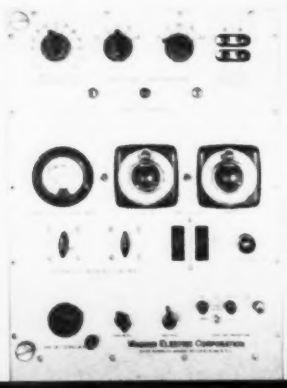
MAXIMUM LIFE CONTACTS

All switch contacts, both moving and stationary, are alloyed copper for maximum resistance to wear . . . reliability proved by life tests far exceeding normal operating conditions. Moving contacts self-aligning . . . free parallelogram action assures maximum contact area with constant pressure.



SINGLE SHAFT DRIVE

A single main drive shaft, geared to the drive motor and to the drive pinion, operates the tap selector switch and the load transfer switch. This shaft also operates the position locating switches and the position indicator.



MAGNETIC AMPLIFIER CONTROL Magnetic amplifier control eliminates moving contacts in the voltage sensing circuit . . . provides simplified and highly accurate band width control.

B759-14

Versatile design of Organic Power Reactor permits wide variety of fuel elements

How do you guarantee an atom?

Begin with the knowledge of experienced scientists... conduct a seven-year research and development program ...collect a wealth of solid operating experience. Result: GUARANTEED PERFORMANCE of a nuclear power reactor, designed by Atomics International to help meet the world's power needs.

This is the ORGANIC POWER REACTOR—outgrowth of research and development on the organic system and operation of the Organic Moderated Reactor Experiment (OMRE) conducted by Atomics International for the U.S. Atomic Energy Commission.

Outstanding advantages of the ORGANIC POWER REACTOR: Low capital investment • Low cost operation • High inherent safety and flexibility • Reliability resulting from

• Non-corrosive moderator coolant • Low pressure system
• Conventional, off-the-shelf components and materials
• Easy access during operation

Atomics International is ready to furnish complete ORGANIC REACTOR electric power plants, including fuel elements, in a wide range of power levels. An experienced field staff will assist with initial plant operation, personnel training and maintenance procedures.

For details contact: ATOMICS INTERNATIONAL, Canoga Park, California, U.S.A. Cable address: ATOMICS.

ATOMICS INTERNATIONAL
A DIVISION OF NORTH AMERICAN AVIATION, INC.
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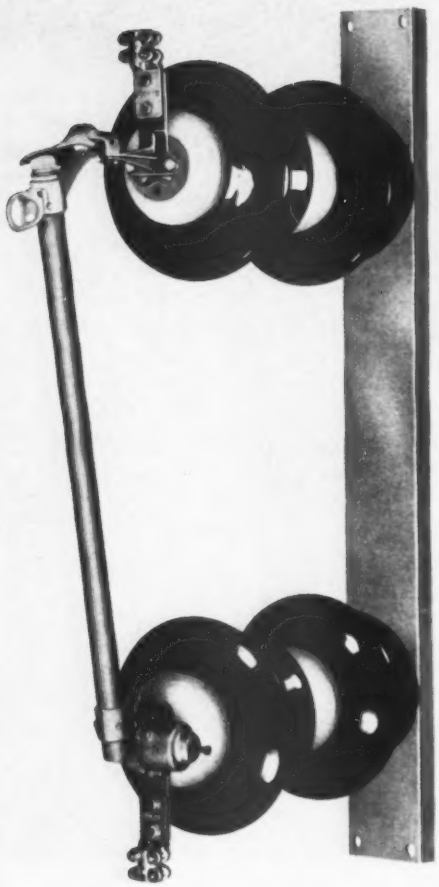
Other offices in: Washington, D.C., U.S.A.; Geneva, Switzerland. Affiliated with: INTERATOM, Bensberg/Cologne, Federal Republic of Germany

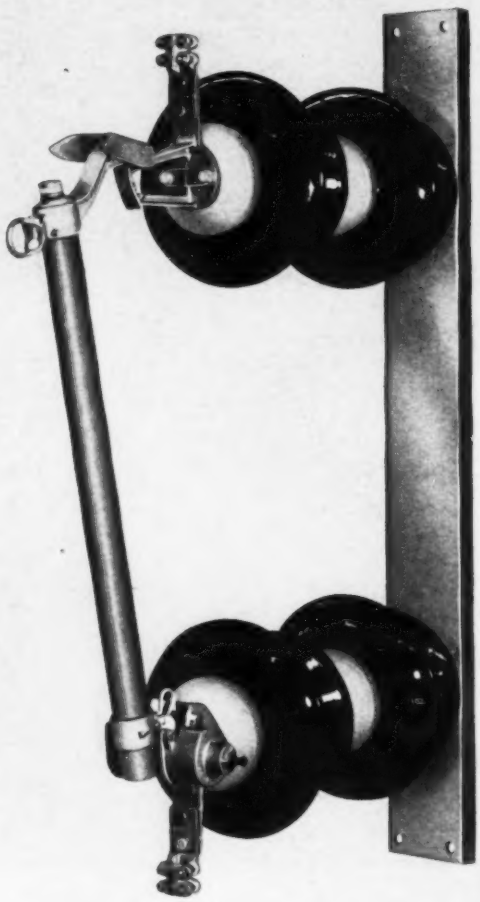
A Powerful New Family of



TYPE BP

7.5 kv to 69 kv—100 and 200 amps

This heavy duty power fuse is ideally suited for economical system protection when interrupting capacities range no higher than 1,491,000 kva.



TYPE MP

46 kv to 161 kv—100 and 200 amps

This extra heavy duty power fuse is the huskiest of the Southern States line, with interrupting ratings as high as 3,480,000 kva. A real brute!

PIONEERS IN POWER FUSES SINCE 1924

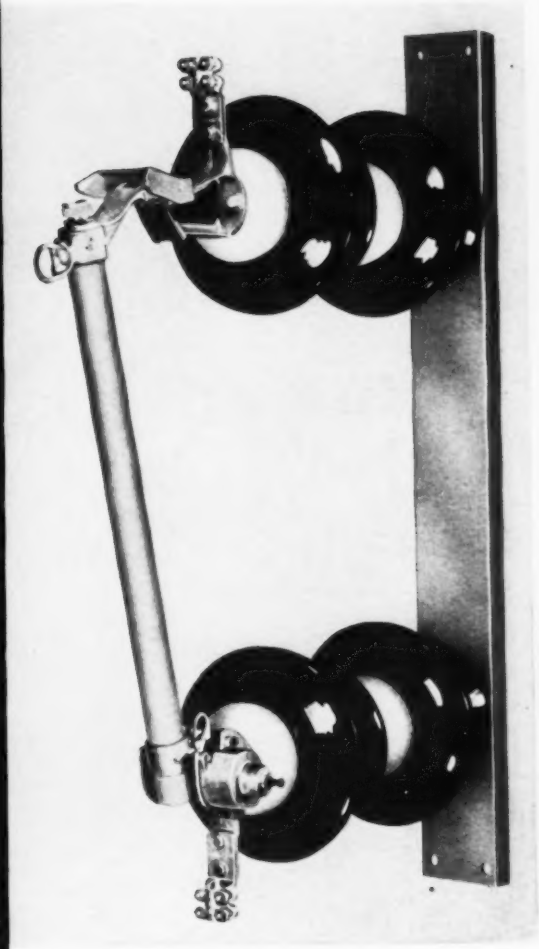
SOUTHERN STATES EQUIPMENT CORP.

HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

For phone number of closest representative see advertising index in back of book.

Power Fuses by Southern States



TYPE HP

7.5 kv to 69 kv—300 and 400 amps

This extra heavy duty fuse is especially suited for applications requiring a combination of high continuous current and interrupting ratings.

COMPLETE FUSE KITS AVAILABLE

These economical kits, in clearly marked packages, provide field personnel with *all the components* necessary for quick, easy re-fusing. They are available in four speed ratios to meet all requirements. Contents are sealed in moisture-free polyethylene bags.

- **HIGHEST INTERRUPTING RATINGS**
  Up to 785,000 kva at 23 kv—
  2,350,000 at 69 kv—3,480,000 at 161 kv
- **LOWEST INITIAL AND RE-FUSING COSTS**
- **WIDEST RANGE OF SELECTIONS**

Here is the greatest development in power fuses in years! It comes at a time when higher system faults and complex load conditions call for greater reliability in system protective devices.

Southern States Power Fuses can be used with full assurance of positive interruption in the complete range of fault currents—from the lowest that will melt the current-responsive element to the worst jolt the system can deliver!

The fuses employ a new fuse holder design and rugged fibreglass* fuse tubes to clear faults at values never before thought possible.

For example, look at these representative ratings:

TYPE	KV	KVA 3 phase symmetrical
BP	7.5	162,000
BP	15	406,000
BP	23	785,000
BP	34.5	1,175,000
MP	46	1,988,000
MP	69	2,350,000
MP	115	3,110,000
MP	138	2,980,000
MP	161	3,480,000

Find out how these new Southern States Power Fuses can be used on your system—to provide greater protection at lower cost. See your Southern States representative, or

WRITE FOR NEW TECHNICAL BULLETIN 59PF

SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

**For economy and where duty requirements are not excessively high, fuse tubes of NEMA grade XX bakelite are available below 46 kv at lower prices.*

ELECTRIC FORK LIFTS:

...easier to maneuver...

no gear shifts...quiet...clean

...vibrationless...last longer...

cost less to run, maintain.

PROVE IT YOURSELF by keeping simple maintenance records. Handy record forms can be obtained by writing us in San Francisco (Room 410). Forms provide a convenient way to record your labor, parts and fuel costs. Compare your costs with any published reports on electric fork truck operating costs. You'll find the electric truck has proved much more efficient and economical.

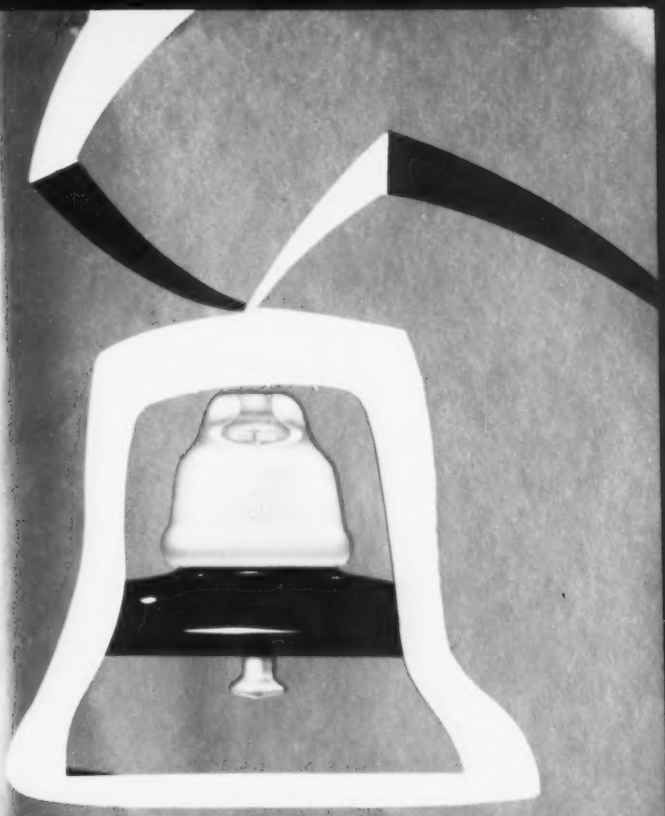
Electricity is cheap in California

P·G and E·

Pacific Gas and Electric Company

408-X-459

from the company
that introduced the modern
suspension insulator
in 1909
a major advance in
suspension insulator design . . .



Ohio Brass Presents

FUTURA

- *a new suspension insulator*
- *made for tomorrow's transmission problems*
- *offered in the Golden Anniversary Year of the modern suspension insulator by the Company that has placed 50 million suspension units in service.*

FUTURA

high strength with less weight

Futura insulators are made with three basic strength ratings

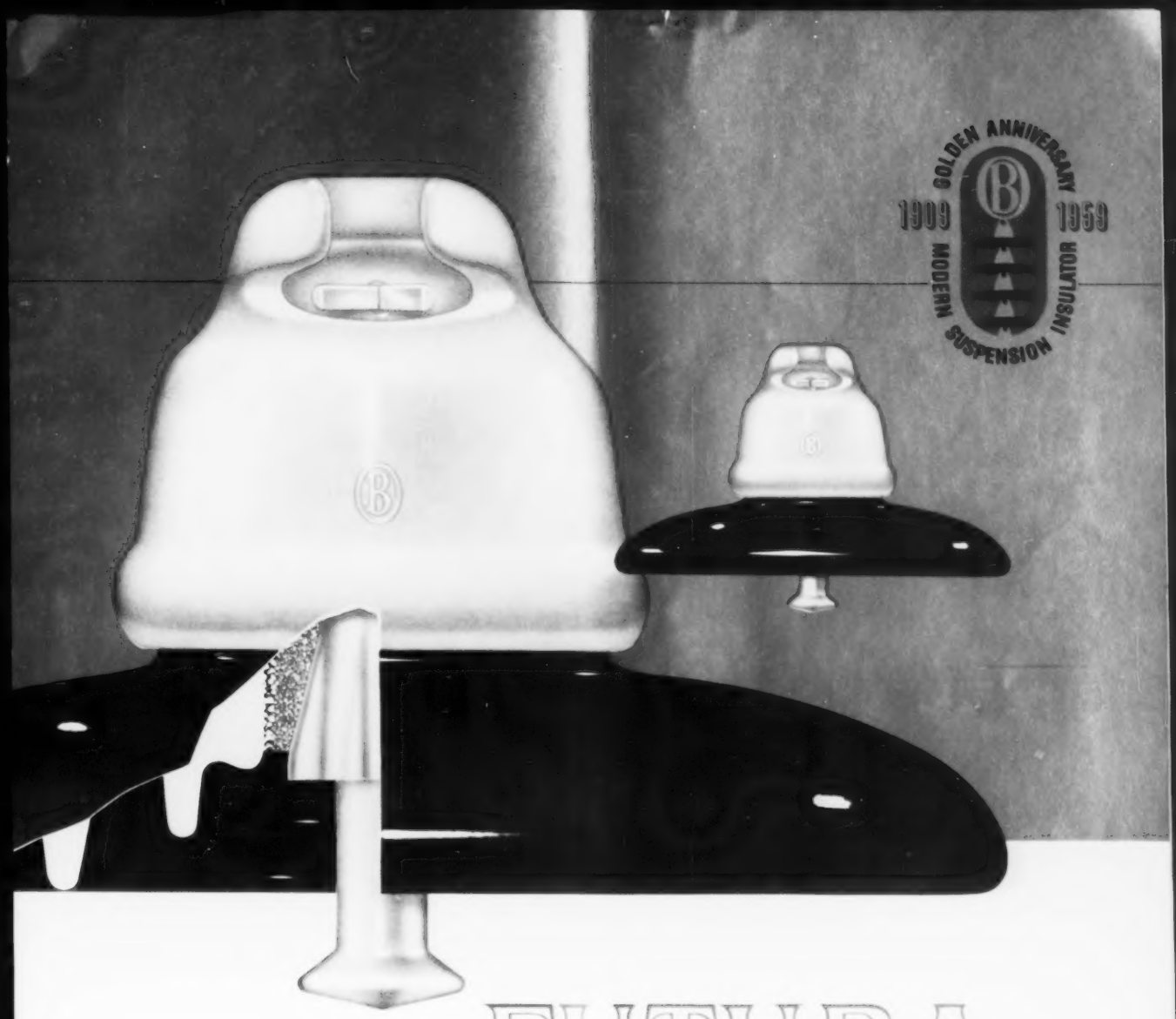
. . . 18,000 pounds M. & E., same dimensions as present 15,000

. . . 25,000 pounds M. & E., strong, light (only 12 pounds)
(standard colors; brown or gray)

. . . 36,000 pounds M. & E., weighs just 15.5 pounds

These "miniaturized" designs provide high strength with less weight. They have resulted from more efficient loading of porcelain; improvements in processing of ceramics; and increased mechanization which has brought new, much higher, standards of quality control.

Futura insulators anticipate tomorrow's transmission line requirements. Miniaturization of insulator design is in keeping with the trend to larger conductors, used singly or in bundled form. Moreover, only one basic insulator is needed for all positions on the line.

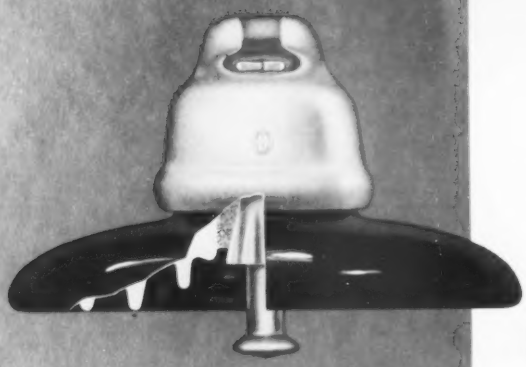


FUTURA

protection against increasing danger of corrosion damage

Since porcelain does not deteriorate with age, most utility operators believe corrosion of hardware is the only serious threat to insulator life. That threat is likely to become more serious as voltages go higher and contamination increases. Unless steps are taken to counteract it, corrosion will start causing trouble where it never did before.

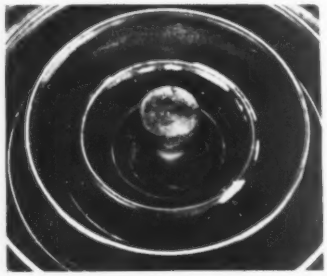
O-B has invented a way to protect insulators against the corrosion that induces cracking of porcelain. A Corrosion Intercepting Sleeve is attached to the insulator pin. As corrosion products form above the cement line, the sleeve slowly collapses without setting up dangerous stresses in the porcelain. In conventional designs, comparable corrosion - - even in very small amounts - - will set up bursting stress.



Conventional suspension insulator cracked after six years on same line where Futura prototypes have served 15 years. Arrows indicate small oxide deposits which caused damage.

These insulators served on the same Line

An experimental prototype of the Futura insulator, with the Corrosion Intercepting Sleeve, was returned after 12 years of service in the same location as the cracked insulator shown above. Corrosion attacked sleeve but no cracking of porcelain occurred. Other units now have served 15 years -- proof that the Futura design works where other insulators fail.



FUTURA

protection proved effective in 15 years of service

Although the Corrosion Intercepting Sleeve is being offered for the first time, it already has performed successfully for 15 years under severe contamination conditions. *It has served without failure in exact locations where standard insulators showed initial failures in one to five years.*

Before adopting the Sleeve, O-B engineers made sure its advantages were more than an impressive laboratory theory. Insulators with the Sleeve feature now have 15 years of performance without failure and with every indication that the Sleeve permanently relieves this form of corrosion stress.

FUTURA

improved puncture resistance

Increased uniformity and reduction of electrical stress points have resulted in higher lightning puncture values for the Futura insulators, even though slightly less porcelain is used in the new design. New techniques for measuring time and magnitude of steep wave impulses have brought new understanding of the lightning puncture problem . . . understanding that has been applied in developing the Futura insulator design.

You will be hearing more about Futura insulators, their characteristics, and all-around suitability for the transmission lines of tomorrow.

Ohio Brass OB HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS BUSHINGS · HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4984-H

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this is one of the 10 reasons why

STEEL

CONDUIT IS BETTER

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3 Takes toughest punishments during construction
4 Uses standard tools and accessories
5 Easier to fish with a tape
6 Compatible with all building materials
7 Great resistance to corrosion and alkali reaction
8 Greater protection of conductors after installation
9 Immediate delivery from distributors and mills

10 Proven for more than a half a century in millions of installations

CLAYTON MARK, pioneer in electrical conduit since 1910, specializes in producing steel conduit that meets all building specifications. Our facilities, engineering and production know-how guarantee quality products accepted as "The Contractors' Favorites" in the industry—Electrictube, Hotkote, Galvakote and Enamelkote.

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Please send me your booklet
"Why Steel Conduit Is Better"

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For phone number of closest representative see advertising index in back of book.

NOW IN OPERATION . . .

Equipped with a type MH LTC mechanism in which Moloney's rotary type load transfer switch serves as the sole current interrupter leaving the tap selector mechanism arc free.

The load transfer switch also by passes the reactor on full cycling positions thereby eliminating reactor loss and voltage drop.

Connected to the generator through isolated phase bus duct and equipped with forced oil-to-air heat exchangers, the unit makes a compact, unencumbered installation.

MOLONEY ELECTRIC

SALES

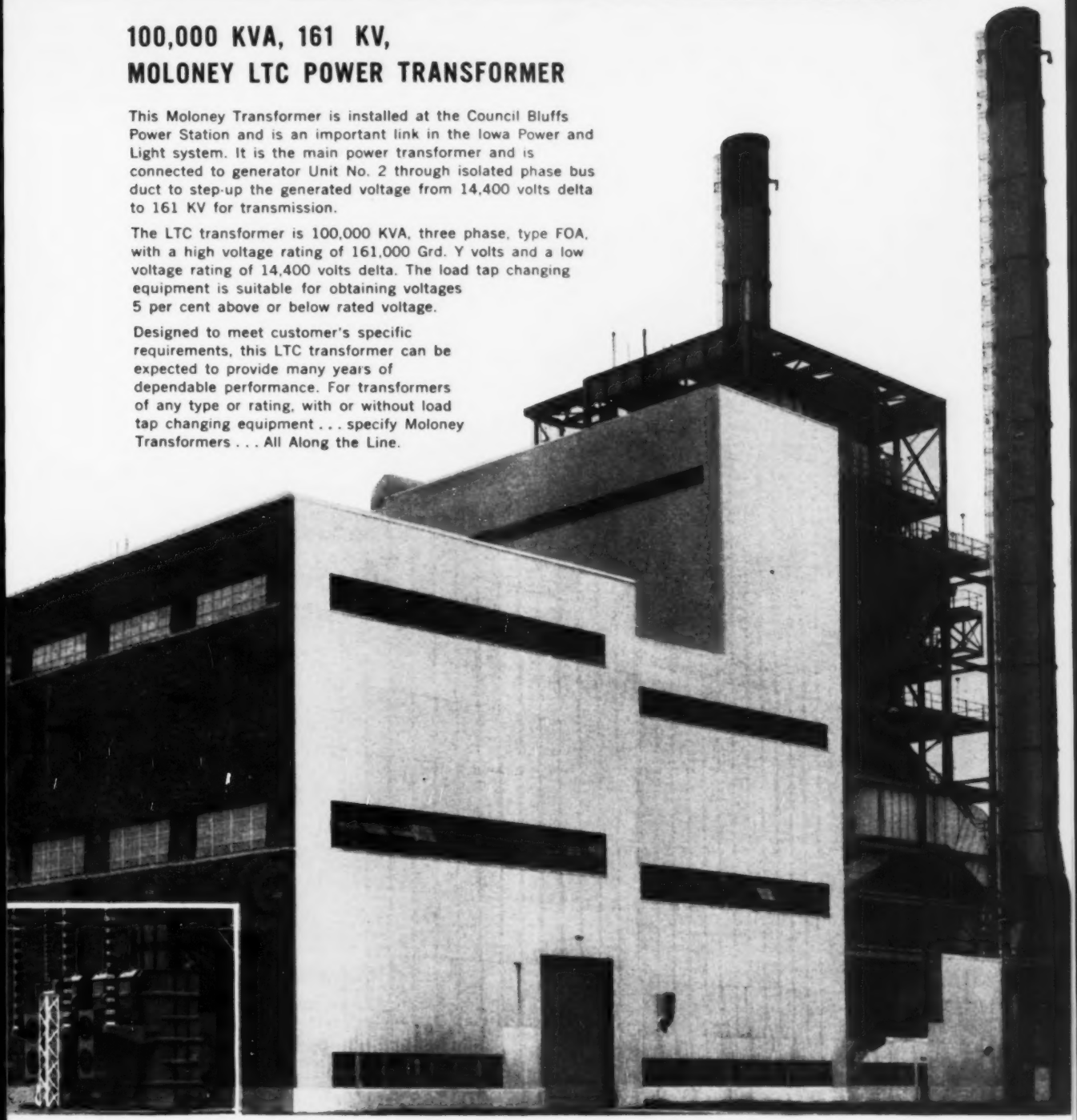
FOR IOWA POWER AND LIGHT COMPANY

100,000 KVA, 161 KV, MOLONEY LTC POWER TRANSFORMER

This Moloney Transformer is installed at the Council Bluffs Power Station and is an important link in the Iowa Power and Light system. It is the main power transformer and is connected to generator Unit No. 2 through isolated phase bus duct to step-up the generated voltage from 14,400 volts delta to 161 KV for transmission.

The LTC transformer is 100,000 KVA, three phase, type FOA, with a high voltage rating of 161,000 Grd. Y volts and a low voltage rating of 14,400 volts delta. The load tap changing equipment is suitable for obtaining voltages 5 per cent above or below rated voltage.

Designed to meet customer's specific requirements, this LTC transformer can be expected to provide many years of dependable performance. For transformers of any type or rating, with or without load tap changing equipment . . . specify Moloney Transformers . . . All Along the Line.



MOLONEY ELECTRIC COMPANY

OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

LIGHTWEIGHT K.W ALUMINUM INITIALLY, CUTS

Costs 20% less than copper with equal current carrying capacity!

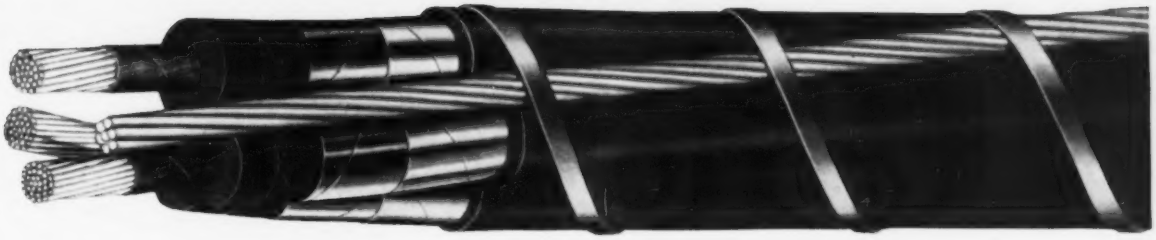
SIMPLE CONNECTIONS

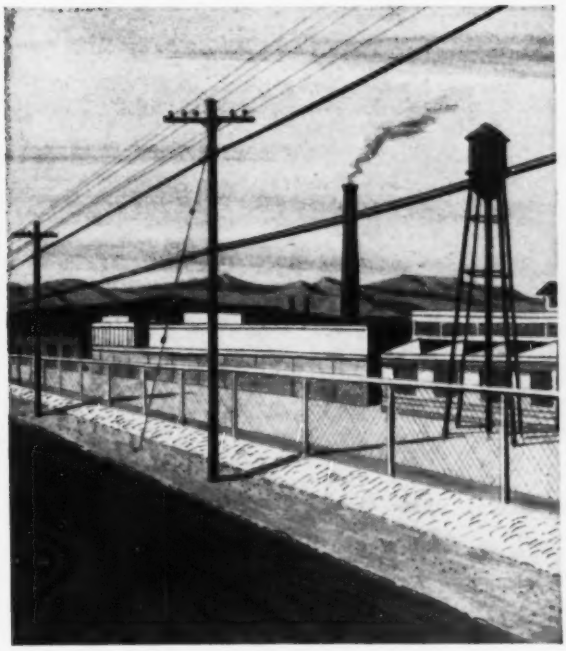
Reverse lay provides simple and fast connections because the conductors can be easily separated to make taps and connections. Tapping can be accomplished quickly, safely and easily.

REDUCES TREE TRIMMING

Unlike open wire construction, compact preassembled KW aerial cable cuts tree trimming to a minimum, initially and periodically. Result: fewer service interruptions or outages during storms, less maintenance.

AERIAL CABLE COSTS LESS INSTALLATION COSTS





FASTER INSTALLATION

Due to its light weight, aluminum aerial cable can be installed to the same sags as copper cable, provides as much clearance, and reduces the tension at pole supports. Additionally, this reduced weight in some cases permits reduction of the messenger size. Less congestion on poles; decreased pole height when used for joint construction with telephone company; improved voltage regulation due to reduced reactive drop.

SAVE on first costs, save on labor and maintenance expenses now with KW aluminum aerial cable. KW preassembled aerial cable is available in both reverse lay and unilay in either aluminum or copper. For immediate service or more detailed information, call the Kaiser Aluminum sales office or KW distributor listed in your telephone directory.

Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California.

KAISER ALUMINUM

"IF IT CARRIES CURRENT, KW CARRIES IT!"

See "MAVERICK" • Sunday Evenings, ABC-TV Network • Consult your local TV listing.

For phone number of closest representative see advertising index in back of book.

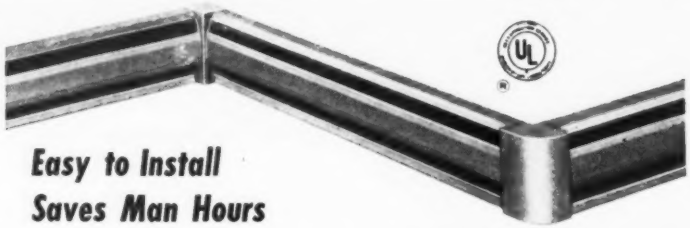
ELECTROMODE®

Most Complete Line of

All-Electric HEATING SYSTEMS
SAFE • EFFICIENT • CLEAN
for EVERY location

LOW-LEVEL BASEBOARD Electric HEATING

Classically slim Electromode LOW-LEVEL Baseboard fits snugly up to wall. Ideal for residences, offices, hallways, institutions, and other commercial and industrial uses. Controlled by room thermostats. Rugged steel cabinets are finished in handsome golden bronze. Customized fittings permit completely flexible installation to room design.



Easy to Install
Saves Man Hours

No Separate End Caps—Easy Access to Wireway—Only 2 Assembly Screws per Unit—Snap-on Front Panel.

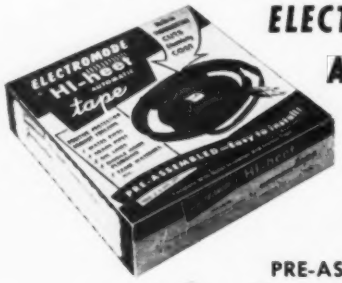
Positive safety is guaranteed by the Electromode exclusive Safety Grid heating element, a finned aluminum casting with all electric wires sealed inside. Provides complete protection against fire, shock or burn. Power shut-off safety switch automatically prevents overheating.

ELECTROMODE FLOOR INSERT Electric HEATER

Specifically engineered to provide a wall of rising warm air directly in front of floor-to-ceiling windows where installation of other types of heaters is not practical. Also solves the problem of supplying heat at the base of an open stair well, and on the inner side of an exterior door. Since this model mounts flush with the floor, it causes no interference or obstruction of passageways. The gray enamel grille can be refinished to match floor if desired. Heater may be installed in wood or concrete slab floors. The Heating Unit can be easily removed for cleaning. Heat is furnished by the Electromode exclusive Safety Grid, famous for its positive protection against fire, shock, or burn. A Safety Switch automatically shuts off heat if any article should cover the heater and obstruct the free flow of air.

*REG. U. S. PAT. OFF.

ELECTROMODE HI-heet



Automatic tape with Built-in Thermostat
Positive Protection Against Freezing

Water Pipes—Drain Pipes—Oil Lines—Mobile Home Plumbing—Farm Waterers, etc.

PRE-ASSEMBLED • EASY TO INSTALL
"Complete With Outer Insulation and Friction Tape"

Automatic Cable
Ends Damage Caused by Freezing in Sub-Zero Weather

Stops freeze-ups . . . Keeps eaves and gutters free of ice . . . Keeps flowers growing . . . Keeps water flowing . . . Frees sidewalks, steps and driveways of ice and snow.

Complete Electromode Line Includes: Baseboard Heaters • Wall and Portable Fan-Circulating Heaters • Radiant Panel Heaters • Insert Duct Heaters • Floor Insert Heaters • Radiant Cable Heat • Suspension-Type Unit Heaters • Combination Portable and Suspension Models • Explosion-Proof Heaters • Milk House Heaters • Pump House Heaters

WRITE TODAY FOR FULL INFORMATION

ELECTROMODE division of Commercial Controls Corp.
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HELPING FLORIDA ATTRACT NEW INDUSTRIES

ABUNDANT, DEPENDABLE ELECTRIC POWER is one of the strongest advantages an area can offer in seeking new industries—as Florida, one of the nation's fastest-growing states, discovered long ago. ¶ Florida Power and Light Company's expansion program has given real meaning to this advantage. After more than doubling capacity of its system in the previous 10 years, the company began another expansion program in 1956 by increasing capability of its Lauderdale steam plant from 96,000 to 426,000 kilowatts. ¶ Even before the new units at Lauderdale went into service, engineering was well advanced and construction started on a new steam plant at Port Everglades. First unit in this 480,000-kw plant is a 240,000-kw generator scheduled for completion next year. A second identical unit is planned for 1961 operation and the plant is designed for ultimate expansion to 1,000,000-kw capacity.

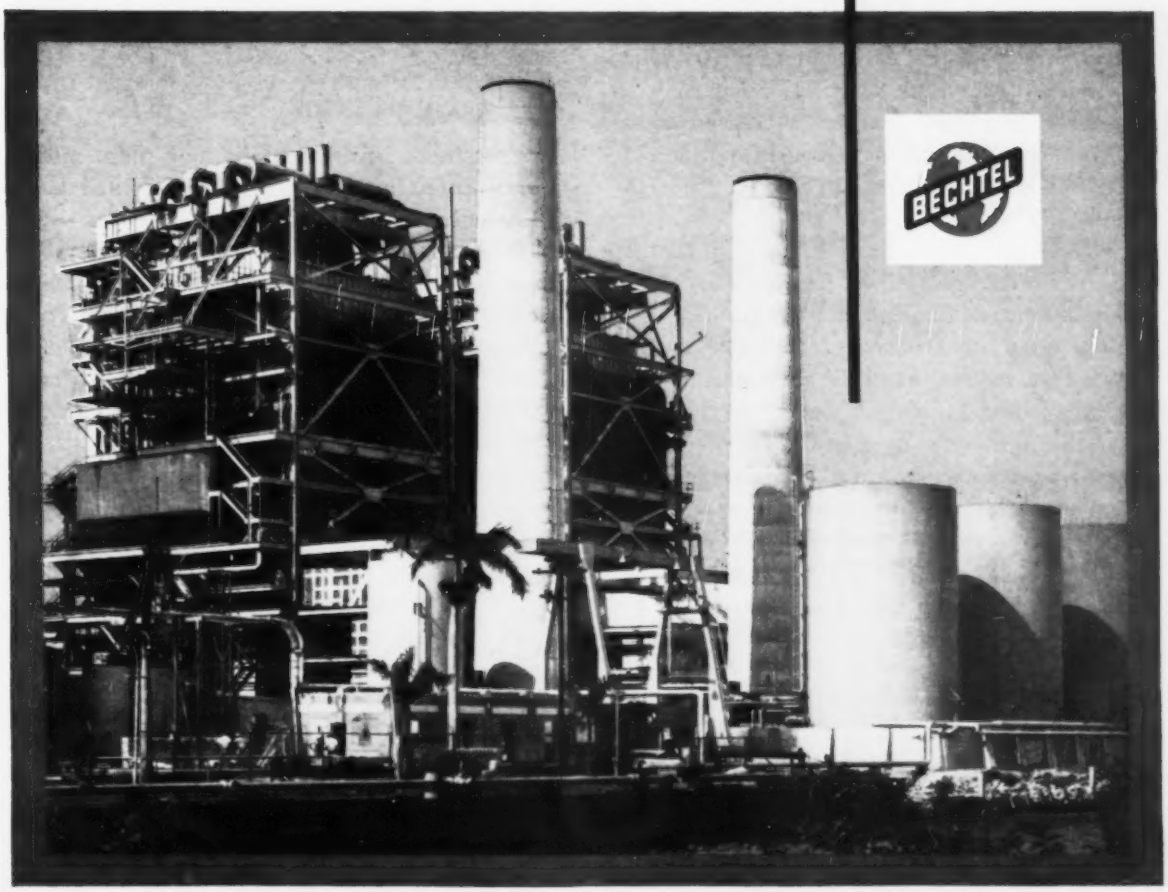
Responsibility for design, engineering and construction of the Lauderdale expansion and the new Port Everglades plant was assigned to Bechtel, working closely with the company's staff.

BECHTEL CORPORATION

Engineers and Builders for Industry

SAN FRANCISCO • Los Angeles • New York • Houston

CANADIAN BECHTEL LIMITED • Toronto



A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

Plan '59

To modernize now for growth and profits

Goes Into High Gear

In 1959, industry will spend more money than ever before to modernize its plant and equipment. But it is not spending enough to do the job that needs to be done.

Manufacturing companies* now plan to spend a total of $24.5 billion on modernization in the four years 1959-1962. This will be enough to replace roughly 70% of the obsolete facilities that were on hand at the beginning of 1959. But it will still leave us far short of our goal. It would take several years, at a higher rate of investment than is now planned, to wipe out obsolescence and give the U. S. a truly modern industrial plant.

These facts stand out from the 12th annual Survey of Business' Plans for New Plants and Equipment just completed by the McGraw-Hill Department of Economics. This new survey shows that industry has made a remarkable start on the modernization job that a previous editorial in this series described as "the most expensive task to be performed in America in this new year of 1959." The full cost of modernization has been found by the McGraw-Hill Department of Economics to be $33.3 billion for manufacturing, and $95 billion for all business.

For the past several months, McGraw-Hill publications have been devoting special attention to new developments in plant and equipment that offer opportunities for modernization. Our special effort to help industry in this regard has been called "Plan '59": to modernize *now* for growth and profits. This editorial will summarize the progress made so far with "Plan '59" and point out some of the areas where business and public policies can do still more to accelerate the modernization drive.

A Good Start

Business investment in new plant and equipment has picked up sharply since the low point of the 1958 recession. Plans for 1959 now show a 7% increase over 1958 for total capital investment. And the increase in expenditures for modernization is much sharper. Moreover, companies already have substantial plans for the years after 1959. New orders for industrial machinery, which are a good index of modernization plans, also are running well ahead of last year.

For the four-year period 1959-1962, manufacturing companies expect, on the average, to devote 65% of their plant and equipment outlays to modernization. This is the highest proportion reported in a McGraw-Hill survey since 1950. In dollar terms, manufacturing companies plan to spend $24.5 billion on modernization during the next four years.

This is an impressive figure, but it does not look so large when compared with the total need

*Excluding petroleum refining, which is reported as part of the oil industry in the data discussed in this editorial.

for modernization in manufacturing industries. As noted above, a previous McGraw-Hill study (conducted in August 1958) found that it would cost almost $35 billion to replace all the facilities that manufacturing companies then considered obsolete. Thus, present plans for modernization are enough to wipe out only 70% of the backlog of obsolete facilities by 1962—and this makes no allowance for the additional facilities that will be made obsolete by new machines and new processes introduced during the next four years. When these new developments are considered, present plans for spending may represent only half the job that will actually need to be done.

How To Accelerate

What can be done to accelerate the drive to modernize our industrial plant and equipment? Two of the greatest aids would be:

(1) Improve present provisions under the tax law for depreciation, to help industry retain more of the money it needs to carry out this massive job of modernization;

(2) Contain inflation, to preserve the purchasing power of the money industry sets aside to replace obsolete facilities.

At first glance, the supply of funds from depreciation allowances appears to be more than adequate. For manufacturing as a whole, depreciation allowances—the primary source of cash for modernization—will total $8.3 billion in 1959, compared with present modernization plans of $6.4 billion. Thus some extra funds will be available to support a further step-up in modernization in 1960.

Unfortunately, however, these depreciation funds are not evenly distributed from industry to industry, or from company to company. For example, in several of the metalworking industries, the prospective flow of cash from depreciation during the next four years is much less adequate than for manufacturing as a whole. These are industries with relatively large modernization backlogs, and they also are industries made up mostly of small or medium-size companies that have difficulty tapping the public money market.

As a result of these industry and company differences, there are many individual cases where shortages of funds limit the amounts of modernization now planned. In the McGraw-Hill survey, nearly half of all companies participating said that they would spend more on new plants and equipment if the depreciation allowances permitted by the tax law were increased substantially over the next few years. Most of these were relatively small companies. Their answers suggest that revision of the tax rules on depreciation should receive the most careful consideration as a spur to faster modernization.

The problem is complicated also by the threat of further increases in the national price level, which would necessarily include prices of capital goods. If "creeping inflation" resumes its march during the next four years, depreciation allowances based on present costs will be much less adequate for future needs. This points up the importance of national economic policies to maintain price stability. Unless this can be maintained, industry's dollars will not go far enough to do the modernization job that is needed.

Plan '59 Carries On

Industry's drive to modernize is now well underway. It can make a key contribution to our national strength and prosperity in 1959 and the years ahead. But the biggest part of this job is before us. It is up to the policy makers—in both business and government—to see that the job is done.

This message was prepared by the McGraw-Hill Department of Economics as part of our company-wide effort to report on opportunities for modernization in industry. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or part of the text.

Donald C. McGraw
PRESIDENT
McGRAW-HILL PUBLISHING COMPANY, INC.

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This fact is of the utmost importance to every engineer engaged in the design and manufacture of tubes with greater reliability regardless of size.

Whenever tube engineers needed alloys of particular characteristics for cathodes, plates, grids, seals, etc., D-H has developed the proper metal compositions to meet their specifications.

Through vacuum melting and other types of close analysis control techniques, D-H research continues at an accelerated rate to improve the reliability of melt-approval techniques.

This is the reason for the great diversification of D-H electronic alloys . . . the reason why so many engineers turn to Driver-Harris for the production of the exact special-purpose alloys they need.

Prominent alloys of this group are: Nichrome*, Karbomet*, Gridnic*, Therlo*, 499, 599, 152 Alloy, 142 Alloy, 146 Alloy and INCO Alloys 220, 225, 330.

Now several of these are supplied *exclusively vacuum melted;* others can be on specification. In all there are now over 132 D-H alloys available for electronic and electrical applications. If your alloy need cannot be satisfied by any of these, send us your specification and depend on it . . . Driver-Harris will produce it.

*T.M. Reg. U.S. Pat. Off.

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NOW FINEST IN THE INDUSTRY

NEW INDUCTION WELDING *gives smoother seams . . . seams that are actually stronger than the metal itself.*

Continuous Testing Protects Product Quality

1. Rockwell tests for hardness
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4. Torque wrench tests to measure lbs. per sq. inch pressure
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Inquire at your local National Electric Distributor or write now to: *National Electric Division, H. K. Porter Company, Inc., Porter Building, Pittsburgh 19, Pa.*

EASY TO BEND: *High ductility makes possible difficult bends and offsets. Fast, easy fishing.*

NATIONAL ELECTRIC DIVISION

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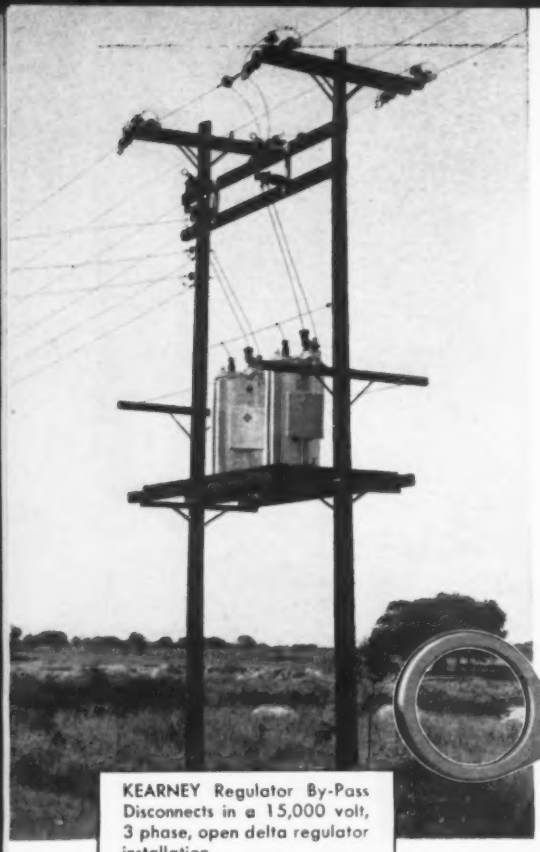
H.K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Copper and Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

Safe performance

of 4 operations in proper sequence assured by KEARNEY *REGULATOR BY-PASS* DISCONNECT



KEARNEY Regulator By-Pass Disconnects in a 15,000 volt, 3 phase, open delta regulator installation.

- **no danger of accidentally dropping load**
- **no hazard from interrupting exciting current**

With the same motion—in the same time—required to open *one* conventional disconnect, the KEARNEY Regulator By-Pass Disconnect:

shunts the line leads to by-pass the regulator—opens both leads to the series winding—safely interrupts the exciting current.

What's more, you realize substantial savings in cost of switches, installation time, supporting structure and leads, because *only one* KEARNEY By-Pass Disconnect is needed for each phase of a regulator installation, compared to *three* single-throw disconnects. And the operator has *maximum safety*, since all switches can be located on the same side . . . visible from one point!

JAMES R. KEARNEY CORPORATION, *General Offices:* 4224-42 Clayton Avenue, St. Louis 10, Missouri

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, Haywood and Hartzell, Inc., Los Angeles • Seattle • Portland • San Francisco • Spokane • Phoenix.

348

for BETTER CONSTRUCTION
SAFER MAINTENANCE

Specify KEARNEY PRODUCTS

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. GUELPH, ONT.

The Mark of Quality

Plants at: ST. LOUIS • FAYETTEVILLE, ARK. • SHENANDOAH & CLARINDA, IOWA—GUELPH, ONT., CANADA

LETTERS TO THE EDITOR

A Question of Patent

To the Editor:

You and your fine publication appear to have been misled, and in turn you may be misleading your readers with the publication of details of what appears to be an imitation of a patented product which has acquired wide commercial acceptance.

Your June issue arrived this morning. On p 18 you show a splicing method presumably submitted to you by Fanner Mfg. Co., Electrical Products Division, Brookside Park, Cleveland 9, Ohio.

This is NOT a new splicing device per se; but it may be a new splicing device offered by Fanner Mfg. Co. However, a splicing device, comprised of a group of helical rods that have been preassembled into subassemblies coated internally with a conductive grit, is a patented product of Preformed Line Products Co. U. S. patent number 2,609,653, and other patents pending, applies.

Perhaps you'll recall that in May and June of 1958 each issue of your publication carried an advertisement entitled "Wrap up Splicing Problems for Keeps." A copy of this advertisement is enclosed. Please note the inclusion of the patent numbers in this advertisement.

I'm enclosing also a copy of each of two copyright publications of this company. It would be difficult not to recognize the similarity between the first photograph in the "Applications Procedures for Preformed Splices" and the lower photograph on p 18 of your June issue, immediately above the subtitle "Splicing Method."

It is the recommendation of this company, from a safety and comfort standpoint, that gloves be worn by the lineman applying a Preformed Splice. The barehanded application of even an apparent imitation of our patented product would hardly seem to be in the best interests of the individuals concerned.

As you are probably aware, Preformed Line Products Co. is involved, as the plaintiff, in litigation against the Fanner Mfg. Co., the defendant, in alleged infringements of patents and unlawful trade practices. Final briefs have been filed and a decision is expected from the presiding judge sometime in the future.

I shall look forward to receiving your comments on this letter and would appreciate receiving an indication from you of what action you intend to take should your publication be confronted with a similar situation in the future.

G. C. Higginbotham
Sales Promotion Manager
Preformed Line Products Co.
Cleveland, Ohio

We find that it is virtually impossible for us to check the validity of patent rights on each new product offered by any or all electrical manufacturers. In this respect we must trust the integrity of the manufacturers who offer product news releases to us. When controversies do arise and are settled in the courts we will report them in detail if we receive the information. This we will hope to do when the case pending between Preformed Line Products Co. and Fanner Mfg. Co. is resolved.—The editor.

AUTOMATIC STREET LIGHTS
MOSCOW (UPI) — Street lights that automatically switch on at night and off in the morning have been installed in the city of Simferopol. The lights are controlled by a photoelectric "eye" that reacts as twilight sets in and, again, at dawn.
BOSTON GLOBE 5, 21, 59

somethings been added to the poles of Simferopol!

We're always happy to welcome a new convert to photoelectric streetlighting control — and the news flash above calls for special salutations. It's too bad there aren't more details — such as what's in the circuit, who built it and what kind of protection he's got.

It does seem, though, that there may be a few little problems peculiar to their locale. If there should be a sudden change in the office of the Commissar of Streetlighting, the new man may not be satisfied with the former mounting methods, turn-on times, protective devices and the like. A new broom could sweep away all the old specs and demand new ones — and get a whole new set of problems in the bargain. And if there's one place the lights had *better* turn on night in and night out — well . . . . It certainly makes control reliability a life-or-death proposition, and a failure rate of 0.0001% per year unspeakable.

So welcome to the clan, comrades; and the best of luck with whatever you've put up on the poles of Simferopol. We only wish *we* could claim we'd been first in this business, but that's out of the question now. One suggestion though: if you do run into long-term reliability problems and things start popping, give us a call. Maybe some of the answers we've found in the various controls we've built since 1945 could be just the ticket. They're capitalistic, but quite a few utilities here think enough of them to use them — and even some of our competitors prefer our design. The Fisher-Pierce Co., 43 Pearl Street, South Braintree 85, Massachusetts.

FP
FISHER PIERCE
PHOTOELECTRIC LIGHTING CONTROLS
AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

CROUSE/HINDS

Condulet®
electrical equipment

the one complete line for corrosive locations

Photo shows Feraloy Condulet conduit fitting after several years exposure to hydrochloric acid. Note extreme deterioration of conduit.

RESISTS chemical and galvanic corrosion

RESISTS acids, alkalis, salts

RESISTS varying concentrations and temperatures of corrosive liquids, vapors, gases, dusts

Corrosion problems would be simple if there were a single material which would resist all corrosive substances.

Since there is not, Crouse-Hinds provides electrical equipment in four materials which offer a selection to meet virtually every known corrosion problem . . .

FERALOY® features the desirable characteristics of cast iron: strength, corrosion resistance, versatility, adaptability, economy. Plated with zinc and cadmium, Feraloy Condulets will combat most corrosive elements.

ALUMINUM ALLOY develops its own self-repairing oxide film which resists a number of corrosive conditions. Copper-free Aluminum Alloy Condulets effectively resist galvanic corrosion.

PLAST-A-COAT, a polyvinyl chloride, is a resilient coating which withstands abrasion and repels corrosion from caustics, alkalis and heavy mineral acids. Tough, non-peeling, it also acts as an insulator.

SILICON BRONZE, when all other materials fail, can be furnished for the most extreme corrosion problems. Counteracts virtually all alkalis as well as salt water, sulfur gases, etc.

CROUSE HINDS
SYRACUSE NEW YORK

Write for **BULLETIN #2699** containing full information on Crouse/Hinds Condulets for Corrosive Locations.

Offices: Atlanta, Baton Rouge, Birmingham, Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Corpus Christi, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Oregon, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Tulsa, Washington. **Resident Representatives:** Albany, Baltimore, Reading, Pa., Richmond, Va.
Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.
Crouse-Hinds Instrument Company, Inc., Silver Spring, Md.

For phone number of closest representative see advertising index in back of book.

Are the appliances you want most in the new home you plan to buy?

Every MEDALLION HOME has an all-electric kitchen with electric range and oven—and more from this list of additional appliances:

Electric DRYER
Electric WASHER
Electric DISHWASHER
Electric REFRIGERATOR
Electric WATER HEATER
Electric GARBAGE DISPOSER

The Medallion award on a new home guarantees you major electrical appliances, already installed. And you get ample wiring ... full Housepower for future needs ... *plus* lighting which is both functional and beautiful.

So look for the Medallion—national symbol of better housing and modern electric living. It identifies today's best new-home buys in every style, size, location and price range. No family should buy a home without the Medallion Home award.

SOUTHERN CALIFORNIA Edison COMPANY *helps you* LIVE BETTER—ELECTRICALLY

Here operator checks application of special lacquer coating which gives CIRTUBE EMT its easy fishing.

The fishing's easier, too with new CIRTUBE* EMT

PULLING wire through carelessly made, ordinary EMT often proves an annoying, time consuming business.

The answer isn't just a slick inside surface—what's needed also is a sort of built-in lubrication that helps conductors glide smoothly through long runs.

CIRTUBE EMT is made that way—with a baked-on protective inner coating containing wax-like ingredients in a special formula—always carefully applied to give the same easy fishing each time.

Here are other reasons why CIRTUBE EMT is always so easy to fish: clean, snag-free finishing is one; induction welding is another. This superior welding technique leaves no flash or bead to interfere with wire pulling.

Easy fishing is only one of many reasons why CIRTUBE EMT has won such quick acceptance. Give it a try next time you order—you'll like working with it. Now at your Circle wholesaler's. *Trade Mark

CIRCLE WIRE & CABLE *a subsidiary of* CERRO DE PASCO CORPORATION

PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** In all principal cities

RUBBER COVERED WIRES & CABLES • VARNISHED CAMBRIC CABLES • PLASTIC INSULATED CABLES
NEOPRENE SHEATHED CABLES • "CIRTUBE" EMT

CIRTUBE EMT *Ask for it!*

Proper steel plus! The best cold rolled steel plus the right handling give CIRTUBE EMT its natural bendability.

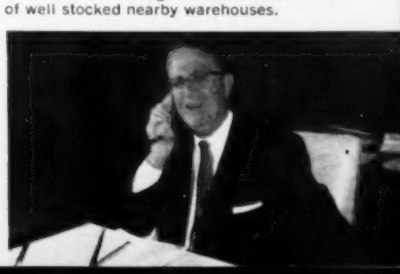
Split-free, bead-free! Induction welded CIRTUBE EMT, left, proves stronger than ordinary EMT, provides easier fishing.

Automated quality control! Automatic controls assure complete and continuing uniform quality of product.

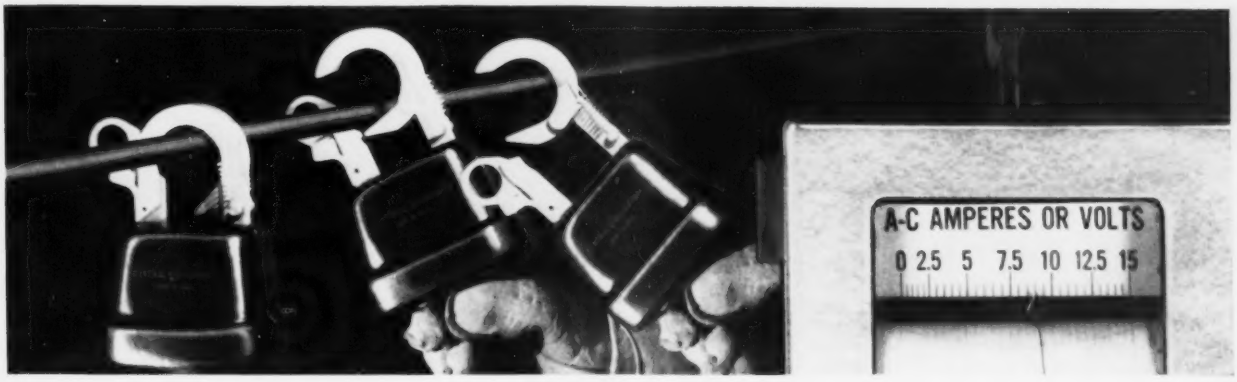
Lifetime exterior finish! Hard galvanized finish for durability; polished satin lustre for lasting good looks.

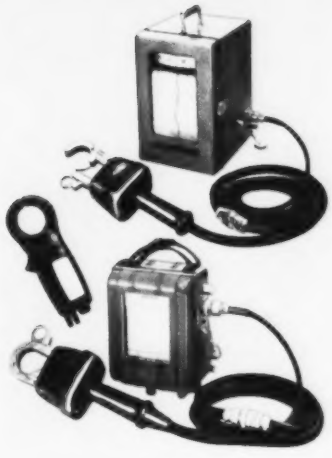
Tight, easily handled bundles! Bright, orange tapes hold CIRTUBE EMT securely for easy handling on and off the job.

Fast, friendly service! Well-known Circle service through a nation-wide network of well stocked nearby warehouses.



hooks on, records dips, peaks . . .





This new General Electric Type CH-7 "hook on" continuously records all transient dips and peaks up to 750 amps or volts without breaking the circuit. It's portable, inking . . . features throw-away inkwell, 0.7 second response time and 28 chart speeds. ***No power required . . .*** unattended, it operates 60 days indoors or outdoors from a hand-wound, spring-clock chart drive. And the butyl-molded hook-on transformer is now available in ***new 13.2 and standard 8.7 kv-rated insulation.*** Companion portable and switchboard models in the CH inking line record a-c and d-c volts and amps, a-c watts, vars, frequency, and d-c milliamps and millivolts. Or, for an inkless trace, General Electric's ***all-weather*** Type CF-7 portable recorder offers the same hook-on convenience. Indicating Type AK instruments, with trigger-operated hook, give ***quick, accurate readings.*** Range selector rotates with finger-tip pressure . . . only one scale shows at a time. For the complete "hook-on" story just contact your nearby G-E Apparatus Sales Office or Distributor; or write direct to Section 592-103, General Electric Co., Schenectady 5, N. Y.

Other General Electric Instruments for Electric Utilities — *High-accuracy portable, panel and switchboard indicating instruments; recorders, indicator and recorder controllers; halogen leak detectors.*

INSTRUMENT DEPARTMENT

GENERAL ELECTRIC

For phone number of closest representative see advertising index in back of book.

Before you buy another

transformer... COMPARE FEATURES

General Electric—alone—offers <u>all</u> these exclusives which add up to reliability, long life, less maintenance for you

General Electric innovates to earn your orders. So compare these features with competitive features to determine your best transformer buy.

Be sure to compare *all* features. You'll see that only General Electric offers *all* these exclusives: new long-life Melalast† transformer cover finish; new Permalex† insulation; Formex* wire; AL/CU terminals; Strenicor clamps; stainless-steel bands and Nitrile rubber gaskets; valve-type arresters—so that the sum of individual features adds up to greater value in long reliable life.

Before you buy another distribution transformer, compare features—give your transformer manufacturer credit for the extra values he gives you. General Electric Co., Schenectady 5, N. Y.

431-81

* Reg. trademark of G.E. Company. † Trademark of G.E. Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC

GIVE YOUR TRANSFORMER MANUFACTURER CREDIT FOR THE EXTRA VALUES HE GIVES YOU		G.E.	OTHER MFRS.			
MEASURE LOAD BUILDING—do Co.'s other products build load? Does Co. sponsor load-building programs?						
CHECK SERVICE—24-hour shipment? repair and uprating? emergency assistance?						
COMPARE FEATURES—how many exclusive features in terms of longer life; reliability; easy maintenance?						
ANALYZE PRICE—does Co. hold line against inflation with significant product developments?						
EVALUATE INNOVATIONS—has Co.'s research paid off for you? Recent examples?						

FILL IN THE BLANKS . . . See which manufacturer gives you more for your transformer dollar: Mark "X" for a measurable contribution, "O" for insignificant contribution.

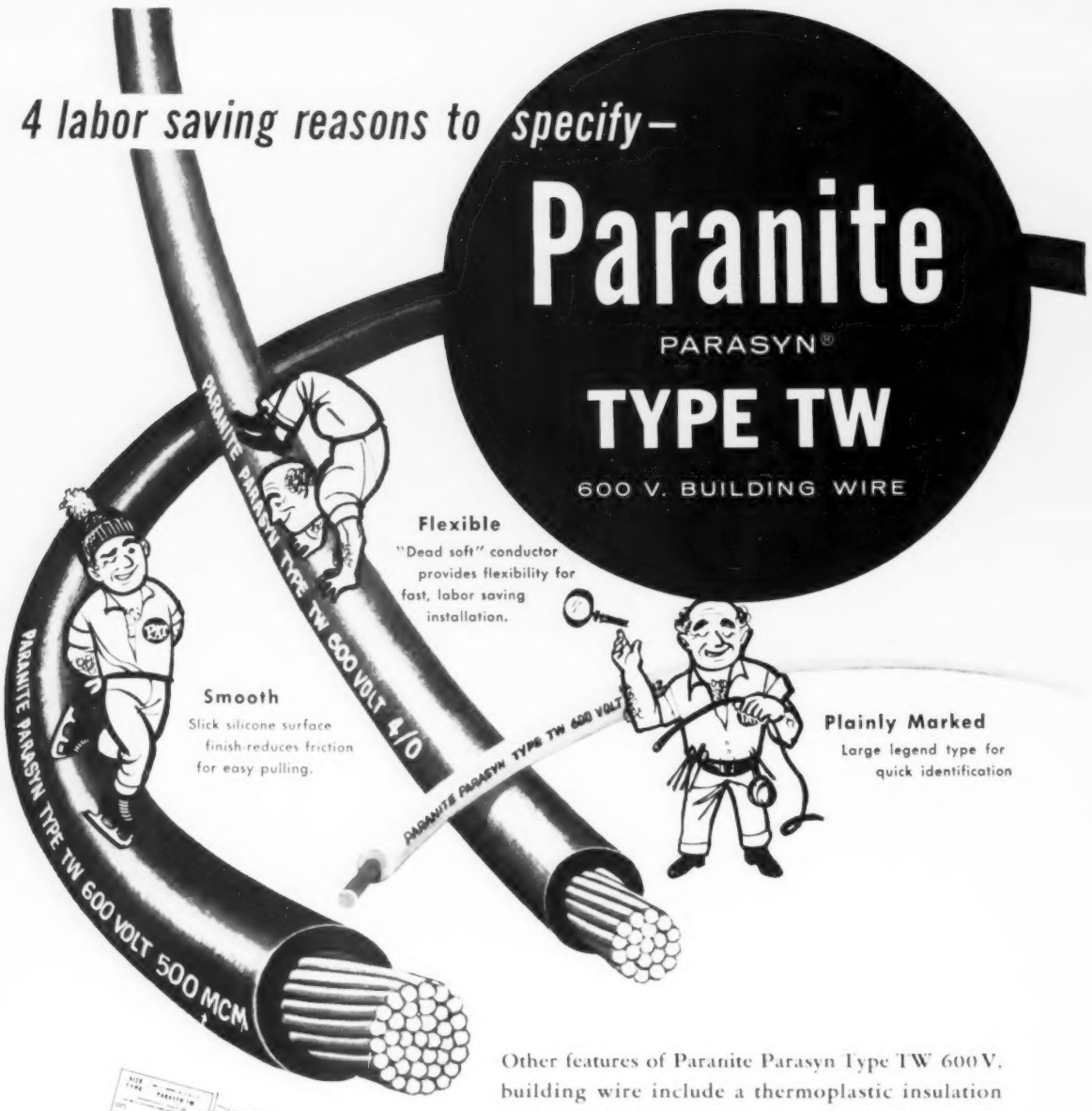
4 labor saving reasons to specify—

Paranite

PARASYN®

TYPE TW

600 V. BUILDING WIRE



Flexible
"Dead soft" conductor provides flexibility for fast, labor saving installation.

Smooth
Slick silicone surface finish reduces friction for easy pulling.

Plainly Marked
Large legend type for quick identification

Other features of Paranite Parasyn Type TW 600 V. building wire include a thermoplastic insulation that provides high dielectric, mechanical strength, longer life and is flame, moisture, and oil resistant.

U. L. listed in sizes AWG 14 through 2000 MCM. Standard colors available from stock in both solid and stranded, sizes AWG 14 through 1000 MCM.

Each Carton packaged to reduce handling and labor cost with "color-coded" labels plainly showing type, size and color of wire. Also, new reel cards for instant identification and inventory control.

PARANITE WIRE AND CABLE DIVISION

Essex Wire Corporation, Marion, Indiana

Sold only through recognized electrical distributors

MANUFACTURING PLANTS: Marion, Ind.; Jonesboro, Ind.; Tiffin, Ohio; Anaheim, Calif.

Sales Offices and Redistribution Warehouses in all Principal Cities

ELECTRICAL WEST VOL. 123, NO. 2 AUGUST 1959

Guests see a demonstration of the "radar range" at dinner program for Sunset Strip International Restaurant Colony, Beverly Hills

Commercial Cooking—Load Builder

Although he has just cooked the hamburger, the man on the cover is not a professional chef. He is Hotpoint's George Klopp and "done to a turn" eggs and pancakes are incidental to his real job—promoting commercial electric cooking in nine Western states. With his counterparts from other equipment manufacturers, he is helping utility salesmen build a profitable load in a largely untapped market.

Electric kitchens have been going into hotels, restaurants and institutions for a good many years but organized utility promotion of this load in most cases is relatively new. Several factors are contributing to this intensified interest including new and improved equipment; growing recognition of commercial electric cooking as a good load to have on the line at any time, a hedge against falling curves during a business recession; greater emphasis in association programs.

Nine Western utilities representing various areas and including large and small operations, publicly and privately owned, expect to add some 91,000 kw of commercial electric cooking during 1959. Estimated annual revenue from this business ranges from $21 to $35 per kilowatt.

Leader in this activity in the West—and in the U. S. last year—is Southern California Edison Co., who broke the 30,000-kw barrier with its 1958 record of 31,197 kw of added commercial cooking load. This year it expects to add another 32,000 kw.

With 19,250 square miles of metropolitan and rural territory in its service area, Edison has 1,587,758 meters—156,758 commercial. Included are approximately 15,000 food service customers.

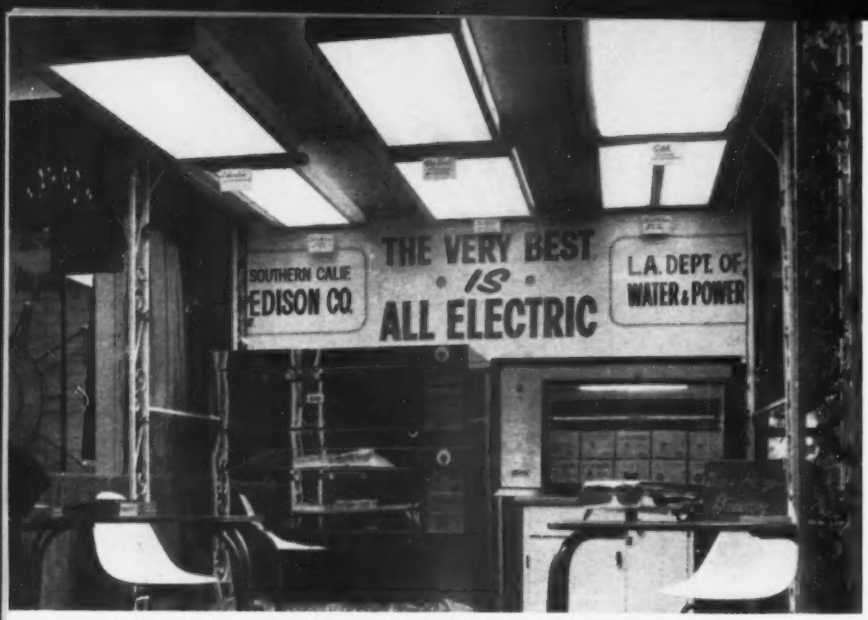
With around 16 full-time specialists in this field, Edison has promoted electric cooking through open house demonstrations; displays at trade shows and before associations; through school feeding clinics and dietitian meetings. Some of its programs have been co-sponsored with other utilities or trade groups.

In recent years, the Edison sales policy has been directed at mass selling wherever possible. In June 1956, it conceived its commercial cooking open house demonstration program, believed to be a first in utility sales promotion of this type.

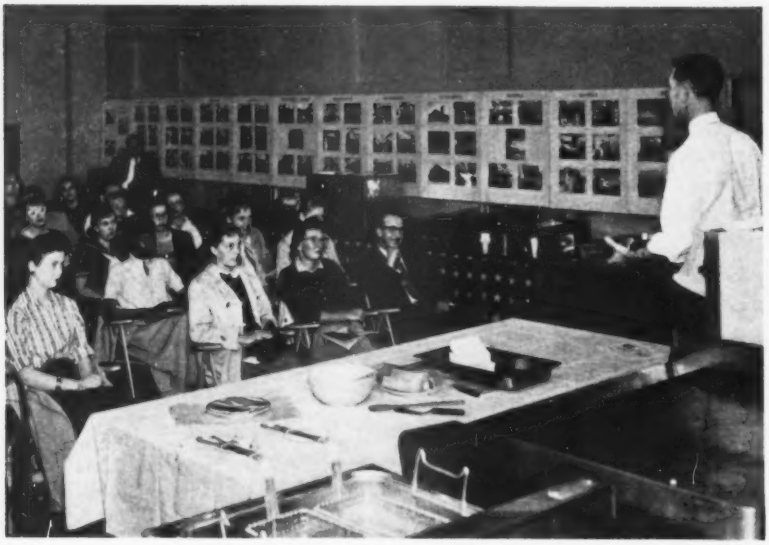
These demonstrations usually are conducted in Edison's electric Living Centers (cooking auditoriums designed for residential promotions but available for these sessions with careful scheduling); occasionally in a dealer's store or a customer's establishment as a co-sponsored open house buffet lunch or dinner.

All types of equipment—cooking, warming and serving—have been demonstrated in this way. To make the event similar to a restaurant show, equipment displays supplement the pieces connected for demonstration. Catalogs, brochures and specification sheets are handed out to food service owners and operators. A display rack contains photographs of all electric commercial cooking installations in the service area and colored transparencies show building exteriors and dining areas.

Open house invitations are mailed to food service owners and operators in the selected area four to seven days before the meeting, which lasts from 10 a.m. to 9 p.m. The 11-hour period permits customers to come at their convenience and results in an attendance that is divided into



Southern California Edison and the Los Angeles Department of Water & Power co-sponsored this equipment display at the Western Hotel Show in the Ambassador Hotel



Edison sponsored a school feeding clinic as part of its 1959 commercial program

groups small enough to allow for individual attention. Invitations, all attractive, vary from conventionally printed announcements to less formal types showing Reddy Kilowatt at work. One clever folder has a penny attached, with the notation that it will buy enough electricity to cook 40 hamburgers or 55 hotcakes or 60 hot dogs.

Manufacturers and distributors make the equipment available for the demonstration and exhibit and several of the allied food service fields furnish products. Edison gives a door prize, usually an electric fry pan. Guests are registered as they enter the auditorium, making them eligible for the drawing and giving the utility an attendance record.

This type of program is popular and has resulted in good public relations with manufacturers, distributors, dealers and the food service industry, says Otis R. Monroe, who handles this activity for T. L. Van Law, Edison's manager of industrial and commercial sales.

During 1957 and 1958, 30 commercial cooking open house demonstrations were held, with about 100 potential customers at each meeting. Average cost per person was $2.50. Four co-sponsored meetings in dealer stores during the two-year period drew the same average attendance at the same cost per person. Seven programs have been conducted so far this year and three more are scheduled.

Other Programs

Eight school feeding clinics were conducted during 1957 and 1958, with average attendance of 75. Two were held at the schools and six in Edison Living Centers, from 7:30 to 9:30 p.m.

Rexburg, Idaho's Madison High School kitchen is all electric . . . . . as is Utah University's Union Building in Salt Lake City

Four co-sponsored customer buffet lunch and dinner programs drew an average attendance of 80 and cost about $3.50 per person. The food was cooked on new electric equipment in the customers' establishment and guests were given an inspection tour of the kitchen.

Electronic oven demonstrations have given more than 500 people the chance to see this equipment in action. Group showings have been before dietitians, the Chefs Cuisine Assn., the Southern California Restaurant Assn., the Building Managers Assn.

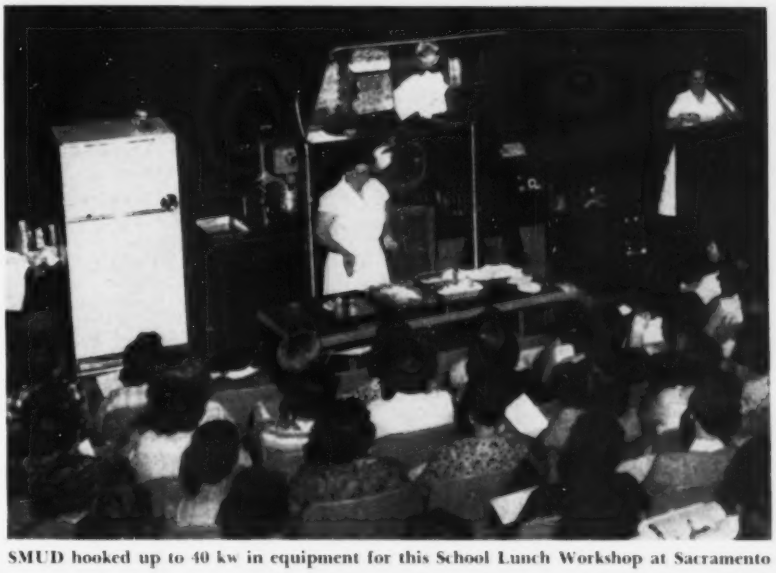
Commercial cooking and lighting were demonstrated and exhibited at the Allied Trades of the Bakery Industry Show in Los Angeles in a booth co-sponsored by Edison with the Los Angeles Department of Water & Power.

Edison and the Department of Water & Power also arranged and jointly sponsored 20 booth exhibits at the Pacific Coast Regional Restaurant Show last fall. Nineteen of these booths were used by electric commercial food service and heat pump equipment manufacturers and distributors. The twentieth booth in this Electric Island was occupied by the two sponsoring utilities.

Many of the companies represented have asked that similar arrangements be made for the October 1960 Restaurant Show to be held in the new Los Angeles Sports Arena. Several have requested additional booth space.

Another type of program being used by Edison is a demonstration arranged with a specific manufacturer, such as the Radarange show it co-sponsored with Raytheon for the Sunset Strip International Restaurant Colony.

One of the manufacturer displays in Electric Island at Los Angeles Restaurant show



SMUD hooked up to 40 kw in equipment for this School Lunch Workshop at Sacramento

More than 200 meals a day are prepared electrically by nine kitchen employees in Doctor's General Hospital, San Jose, Calif.

Washington Water Power Co. designed this 50-kw installation at Third Avenue Cafe, Spokane. Electric heating is included

More than 162 kw of electric equipment make for efficiency in the Parisian Room's modern kitchen at Great Falls, Mont.

Electric equipment in Clark's Pancake Chef at Seattle represents 191.5 kw of connected load for City Light, serving utility

What Other Utilities Are Doing

Following are brief reports from other Western utilities:

Pacific Gas and Electric Co. works its commercial cooking promotion through its divisions and expects to add about 18,000 kw in 1959. The cover picture was taken at Santa Rosa, Calif., where PG and E's North Bay Division cooperated with 18 manufacturers, distributors and dealers to put more than $50,000 worth of equipment on display. On the spot sales totaled more than $1,000.

Montana Power Co. has promoted electric cooking since 1919 and the majority of hotels, restaurants and institutions in its service area use electricity for all food preparation. When natural gas was introduced in the area in 1931 a good many of the large establishments changed over to that fuel; ten years later most of them had made the shift back to electric. Montana Power works closely with architects and hotel and restaurant suppliers in a dealer cooperative program. In gas competitive areas or where propane is a factor, it offers wiring assistance in a flexible program based on connected load and anticipated revenue. Each job is handled individually.

California Electric Power has added a second commercial cooking representative to its sales promotion staff and plans to be more active in this field. It makes counter line equipment available for customer trial and is using test meters to indicate operational cost and compile data for the future. The proposed fall program will use invitational equipment demonstrations for food service operators. More than 500 kw had been added in the first half of 1959, with some 300 kw in the proposed stage at the end of June.

Portland General Electric has two full-time men in the field building its commercial cooking promotion around personalized selling to the restaurant operator. This is done through free demonstrations on the customer's premises and in cooperation with the various dealers and distributors. The utility also cooperates completely with manufacturers in special shows and demonstrations.

Utah Power & Light conducted a commercial cooking and air conditioning promotion in May and June of this year, calling on customers and sending out mailing pieces. In the first month of the drive, dealers in the area had sold 85 pieces of commercial cooking equipment, with a connected load of 588 kw.

Idaho Power led the second division (under 200,000 meters) in Hotpoint's box score on commercial cooking load added through April of this year. Its four-month score was 2,720 kw. It was 1958 winner.

Sacramento Municipal Utility District had a commercial cooking promotion under way as this issue went to press. At the recent Restaurant Show at the Fairgrounds, where 150 kw of equipment were hooked up for demonstration, the SMUD booth used four telephones in a promotion stunt. Each phone had a recorded pitch telling the listener to go see the electric cooking. As a part of its sales training program, SMUD holds informal after-hour get-togethers, outdoors, in a garage or where convenient. At each such meeting, one item of equipment is demonstrated.

Seattle City Light has been active in commercial cooking promotion since 1951, when completion of a study of electricity used in the average restaurant showed this service as a companion to electric water heating, with advantages for customer and utility. First step was to revise an existing electric rate. All food preparation equipment incidental to cooking is eligible for this rate. Also included are refrigeration, air conditioning and electric space heating. Electric water heating may be included if advantageous to the customer. Prompt efficient service and a realistic approach to wiring costs are two of the "musts" in a commercial cooking program, the utility believes.

Arizona Public Service made a commercial cooking sales tool out of an intercity bus converted to a showroom on wheels. This demonstration bus was fitted with latest equipment and traveled nearly 4,000 miles, visiting 60 communities. Advance notice was sent to food service operators and 1,930 people visited the display. The bus also served as a demonstration workshop, and featured school feeding clinics.

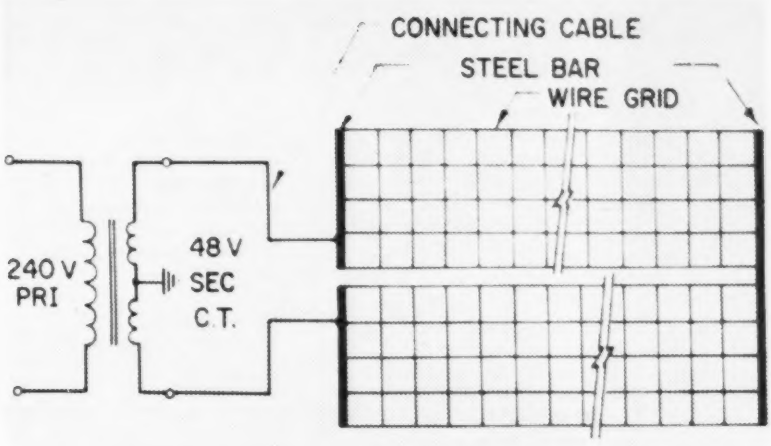
These are a few of the methods being used by the utilities of the West to add this load, with its many customers and utility benefits. It is agreed that hard sell is required to accomplish results and that competition is stiff. As one representative put it: With heavy work schedules to contact the food service industry, "there's no room for a clockwatcher in our business."

Employee training is an important part of a utility's commercial cooking program. Here John Bond, commercial cooking consultant for Portland General Electric Co., helps George Klopp put on a demonstration cooking school for PGE salesmen

Here's an approach to low cost, low voltage . . .

Radiant Floor Heating

Glenn E. Hutchcroft and Howard P. Gluckman
Los Angeles Department of Water & Power



Strips are connected in series to produce a current in each strand of fabric of 25 amp at 48 v. Not less than five or more than eight strands are connected in parallel

In recent years the Los Angeles Department of Water & Power has completed 12 electric floor heating installations, using steel grid mesh as the heating element. These installations are in concrete floors in shops operated by the department, and the combination of low cost and favorable acceptance of those associated with the system suggest that additional applications should be considered.

In recent years a growing understanding of the nature of physical comfort has pinpointed the fact that the human body is much more sensitive to a gain or loss of radiant energy than to efforts to achieve results by control of the ambient air temperature. Thus, in a concrete room with hot air heat, it is possible for the body to suffer from heat and cold (shiver and sweat) at the same time.

The first two installations used lead covered soil heating cable operating at 240 v. An evaluation of this method indicated two weaknesses: first, the necessity of coating the sheath to protect the lead from possible damage by alkalinity in the concrete; and second, the possibility of cable failure or rupture as a result of drilling for anchor bolts. A review of these limitations suggested the use of ordinary 6 x 6 in. No. 10 bare steel reinforcing mesh. This material is readily available, low in cost, easy to install and not subject to either of the limitations imposed by soil cable. The rolls of steel mesh lend themselves to a variety of circuit combinations to conform to the geometry of the floor to be heated. The usual length of a 48-v circuit is 230 ft.

Construction Details

Strips are connected in parallel to form circuits that will operate at approximately 25 amp per conductor on 48 v. Seven taps, each 5% of the normal 48-v secondary, are desirable to compensate for varying grid resistance. Normally the strips are joined by means of a 3/16 x 1½-in. steel bar welded across the ends. Supply conductors, and connections between widely spaced strips, are of insulated copper cable brazed to the steel end strips. All bare copper is wrapped with fiber glass tape or coated with epoxy resin to minimize corrosion. For structural reasons, it has been found desirable to secure the mesh to a 4-in. reinforced slab and to top this with 2 in. of concrete. The heating grid is not accepted by building inspectors as a structural reinforcing element.

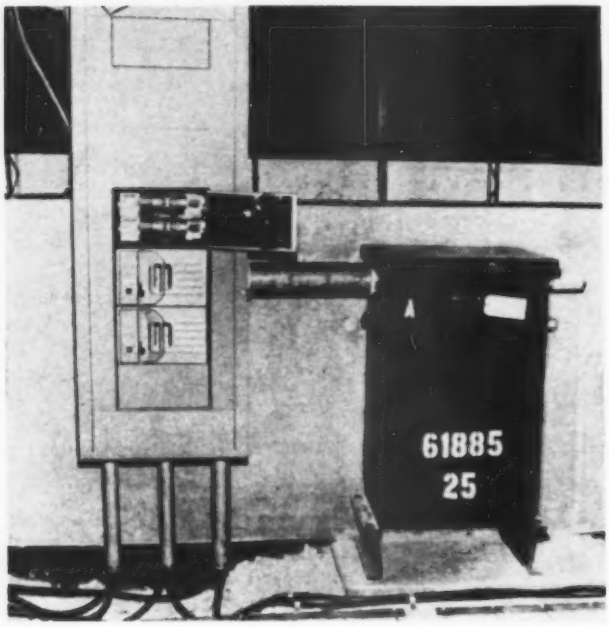
Tests on the experimental installation were witnessed and approved by representatives of the city and state electrical code enforcement agencies.

Power factor of the grids varies with layout, but will not depart greatly from 0.9 lagging.

Leakage Currents

Some installations indicated a noticeable difference between the temperature at the terminal ends of the grid as compared with the center, indicating sizable leakage currents. It was determined, by tests, that the leakage current was of the order of 15%. In search of a method of reducing or eliminating leakage current, several attempts were made to insulate the grid with plastic coatings. These efforts were unrewarding. Another method was to shorten circuits and reduce the applied voltage in proportion. Hence, the voltage drop per foot of lengths remained unchanged. The voltage across the leakage path was reduced with the consequent decrease in leakage current. By halving the grid resistance and reducing the voltage to ground from 24 to 12 v, it was found by one test that the floor temperature difference between the ends and center of the circuit was reduced from 8 F to 2 F. Both of these methods have the objection that they increase costs. Coating the mesh is expensive. Operation at reduced voltage proportionally increases the number of branch circuits thereby increasing costs.

Leakage current differences, from low values in some installations to



Dry-type transformer and 200-amp disconnecting fuseholders are used on circuits to protection cabinets

higher than average in others, may be caused by any of various factors. Aggregate and cement from different sources of supply may contain different amounts of electrically conducting materials. The use of admixtures for strength or fast setting may be responsible. These factors are now being investigated as their control would be comparatively inexpensive. The moisture content of the ground underlying the slab is another variable that may affect current leakage. All the slabs were laid on bare ground.

Heating Characteristics

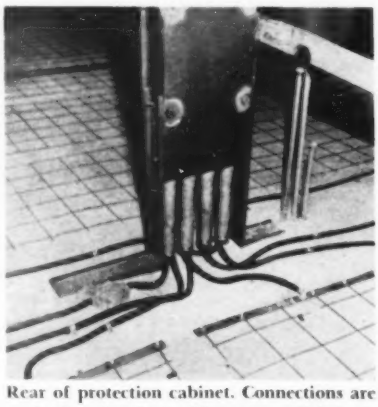
The characteristics of a floor heated in this manner are such that it takes about 10 days to bring the slab and underlying ground area to a temperature that is comfortable in cold weather. This is important in that a heated slab floor *cannot* be made to compensate for short time temperature changes. The system under discussion is essentially "on in the winter and off in the summer." This implies some supplemental heat for nonshop areas.

In southern California, the season for floor heating extends from about Nov. 1 to April 1; and as temperatures seldom drop below 30 F an input of 8 to 10 w per sq ft will maintain floor temperatures of 68 to 70 F. This has been found to be adequate for active workmen without need for supplementary heat.

At 1¢ per kwh, the annual energy costs will average 33¢ per sq ft, and maintenance costs have been negligible. In colder climates somewhat higher inputs may be desirable. Operating costs would increase in proportion, but since all materials except stepdown transformers and protective equipment are relatively inexpensive, capital costs would increase at a lower rate.

Total installed costs have been in the neighborhood of $1 per sq ft, with transformers and protective equipment accounting for approximately one-half of the total. Consequently, a grid system may be installed at nominal cost when a building is built in anticipation of possible future need.

The use of radiant floor heating has been found to be satisfactory; it may be operated as an off-peak load; and the mesh system has proved reliable and economical.



Rear of protection cabinet. Connections are made by the Cadweld process. Fabric is fastened to subfloor with sheet metal clips and 5/8-in. concrete nails

Heat pump tests show

Comfortable

CUSTOMER comfort in a controlled climate, summer and winter, need not represent too great a percentage of total business operating cost. This is shown in a 10-month heat pump operation test and analysis made by Los Angeles Department of Water & Power.

The installation in Safeway's West Los Angeles supermarket has 19,000 sq ft of conditioned area (1,950 sq ft of glass); is open 12 hours a day from 9 a.m. to 9 p.m. It includes five air-to-air heat pumps, 4.9 tons each, with 49,300 Btu of cooling and 43,000 Btu of heating.

Monthly cost of heating and cooling for the test period was $122.99. Highest monthly bill—$164.26—was

Safeway

Month and Year	% Kwh Heating
June 1958	39.14%
July	37.10
August	14.23
September	17.24
October	22.25
November	40.65
December	49.51
January 1959	75.19
February	76.58
March	50.71
Totals	
Mo. avg.	41.97%
Daily avg.	42.26%

Month and Year	Master Meter Kwh
June 1958	43,404
July	43,160
August	42,320
September	18,880
October	20,560
November	42,272
December	40,488
January 1959	45,280
February	39,680
March	43,680
Totals	379,360
Mo. Avg.	37,936 Kwh
Daily Avg.	1,248 Kwh

what it costs to have

Customers

in September 1958; lowest—$102.96—was in July 1958. Average monthly cost of cooling for the period was $71.38. Heating cost an average of $51.61 per month.

The two months not included in the test—April and May—are generally about average. Therefore, based on the 10-month record, total cost of year-round heating, cooling, with proper air circulation, will be 7.68¢ per sq ft per year, it is estimated. Cooling alone represents 4.44¢ per sq ft per year; heating alone, 3.24¢ per sq ft per year.

Details are given in the accompanying table. Demand charges, not shown here, followed the same pattern as for the general power load.

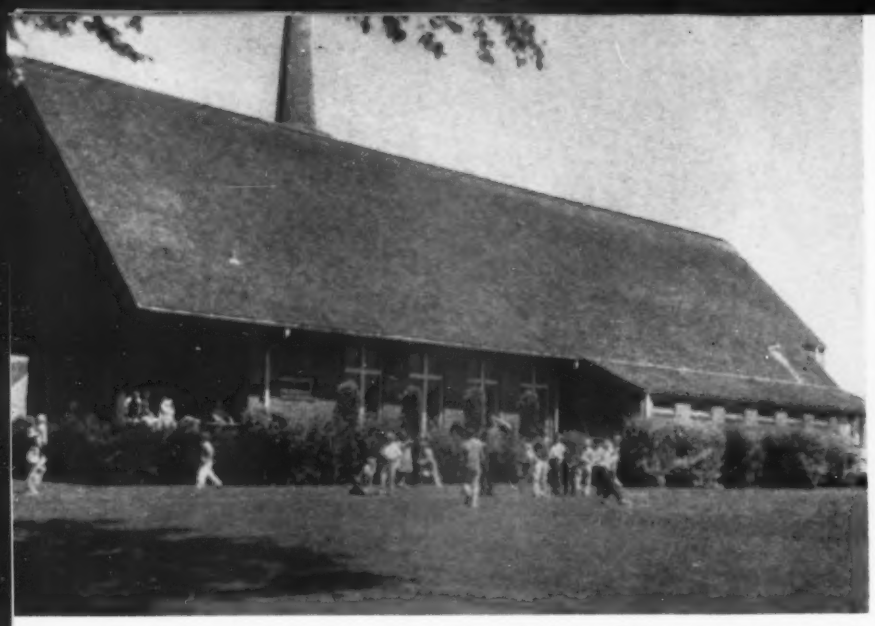
New Safeway Supermarket in west Los Angeles keeps customers comfortable, summer and winter, with heat pump installation. Results of a ten-months operating cost survey by the Los Angeles Department of Water & Power are detailed in the tables below.

Super Market—West Los Angeles

Analysis of Heat Pump Operation*						Weather Data	
% Kwh Cooling	Heating Cycle Amount	Cooling Cycle Amount	Heating Cycle % of Total	Cooling Cycle % of Total	Combined Cycles % of Total	Monthly Degree Days	Normal Degree Days
60.86%	$ 41.95	$ 65.25	8.13%	9.14%	8.71%	0	25
62.90	38.20	64.76	7.40	9.07	8.37	0	5
85.77	16.51	99.48	3.19	13.94	9.43	0	2
82.76	28.32	135.94	5.49	19.05	13.35	0	10
77.75	27.74	96.93	5.37	13.58	10.14	0	60
59.35	49.12	71.72	9.52	10.05	9.82	64	140
50.49	55.95	57.06	10.84	7.99	9.19	118	265
24.81	100.12	33.04	19.40	4.63	10.83	148	356
23.42	96.41	29.49	18.68	4.13	10.24	209	252
49.29	61.85	60.11	11.98	8.42	9.92	55	248
	$516.17	$713.77	100%	100%	100%	882*	1363
58.03%	$ 51.61	$ 71.38					
57.74%	$ 1.69	$ 2.35					

*Seasonal degree days

Total Power Load	General Power Load (Other Than Heat Pumps)		Analysis of Heat Pump Operation*				
Master Meter Amount	General Power Kwh	General Power Amount	Heating and Cooling Kwh	Heating and Cooling Amount	Heating Kwh	Separate Heat-Cool Demand	Cooling Kwh
381.74	29,090	**$ 274.55**	13,950	**$ 107.19**	5,460	33.90	8,490
386.06	29,415	**283.10**	13,745	**102.96**	5,100	33.90	8,645
379.82	26,570	**263.83**	15,750	**115.99**	2,241	33.90	13,509
226.22	1,880	**61.96**	17,000	**164.26**	2,930	33.90	14,070
244.46	9,017	**119.79**	11,543	**124.67**	2,568	33.90	8,975
378.91	25,916	**258.07**	16,356	**120.84**	6,649	34.58	9,707
370.32	25,070	**257.31**	15,418	**113.01**	7,633	34.16	7,785
396.19	26,860	**263.03**	18,420	**133.16**	13,850	34.07	4,570
361.05	22,640	**235.15**	17,040	**125.90**	13,050	33.84	3,990
396.19	26,720	**274.23**	16,960	**121.96**	8,600	32.89	8,360
$3,520.96	223,178	$2,291.02	156,182	$1,229.94	68,081		88,101
$ 352.09	22,318 Kwh	$ 229.10	15,618 Kwh	$ 122.99	6,808 Kwh		8,810 Kwh
$ 11.58	734 Kwh	$ 7.54	514 Kwh	$ 4.04	224 Kwh		290 Kwh



Baseboard heating is used in the Emanual Lutheran Church at Longview, Wash.

Electric Heat For Churches

L. N. Roberson
J. C. Gilbertson
Roberson Inc.
Seattle, Wash.

Electric heating for churches is economically feasible in most areas of the Pacific Northwest. The wide variation in utility power rates makes it advisable to check each area for the available schedules as well as for specific requirements to obtain the most favorable design. Examples of techniques for reducing costs are:

1. Installing time clocks to remove or reduce the heating load in order to take advantage of off-peak rates.

2. Use of controls of various types to limit the demand where demand rates apply.

3. Adding insulation, when possible, to reduce demand, first cost and operating cost as well as to provide summer cooling.

4. Use of heat storage to hold down demand.

Many of the problems encountered in heating church school rooms parallel those of heating public school class rooms.

The conventional church nave with its high vaulted ceiling and, normally, its lack of insulation, presents a difficult heating problem for any heating system. Large glass areas and poorly insulated walls and ceilings quite commonly cause downdrafts in excess of 300 lin ft per minute. These downdrafts on the outside walls drift across the floor under the pews and start up again from the center aisle with the additional help of the body heat of the occupants and the artificial heat of the heating system.

A congregation of 300 people, all seated at rest, produces a total of approximately 30 kw of body heat. Any activity increases the heat output. The heat loss design for a 2-in. T&G ceiling alone in a 2,400-sq-ft nave can exceed 32 kw. The wall and infiltration losses are proportionately large.

The problem is further complicated since the main part of the church may be used for only one service per week or it may be used several times per week and have as many as four services on Sunday. Various meetings may also be held in the smaller rooms and in the chapel, or a church may conduct a day school five days a week. The wide variations encountered in building design, frequency of occupancy and size of congregation make it difficult to establish constants for the cost of operation or even the kilowatt-hour consumption when the electrical rate is known.

Table No. 1 contains data obtained from 13 electrically heated churches in the Pacific Northwest. Not all the data are complete. However, they do show the wide variations encountered. Watts and watt-hours rather than Btu's were chosen as units because the former are the units more familiar to electrical engineers.

Weather bureau data for the Pacific Northwest indicate maximum

Longview's First Christian Church utilizes heating cable installed in the floor

Recommendations:

1. Radiant panel heating from floor or ceiling, where possible, supplemented with baseboard or similar perimeter heating to counteract the downdrafts characteristic of most churches.
2. More adequate insulation for church buildings.
3. Adequate ventilation in the form of ventilated baseboard and exhaust fans or air conditioning equipment.
4. Multistage zone thermostat controls to compensate for the rapid changes in heating requirements caused by solar gain and body heat.
5. Suitable load limiting controls where demand-type rates prevail.

Conclusions:

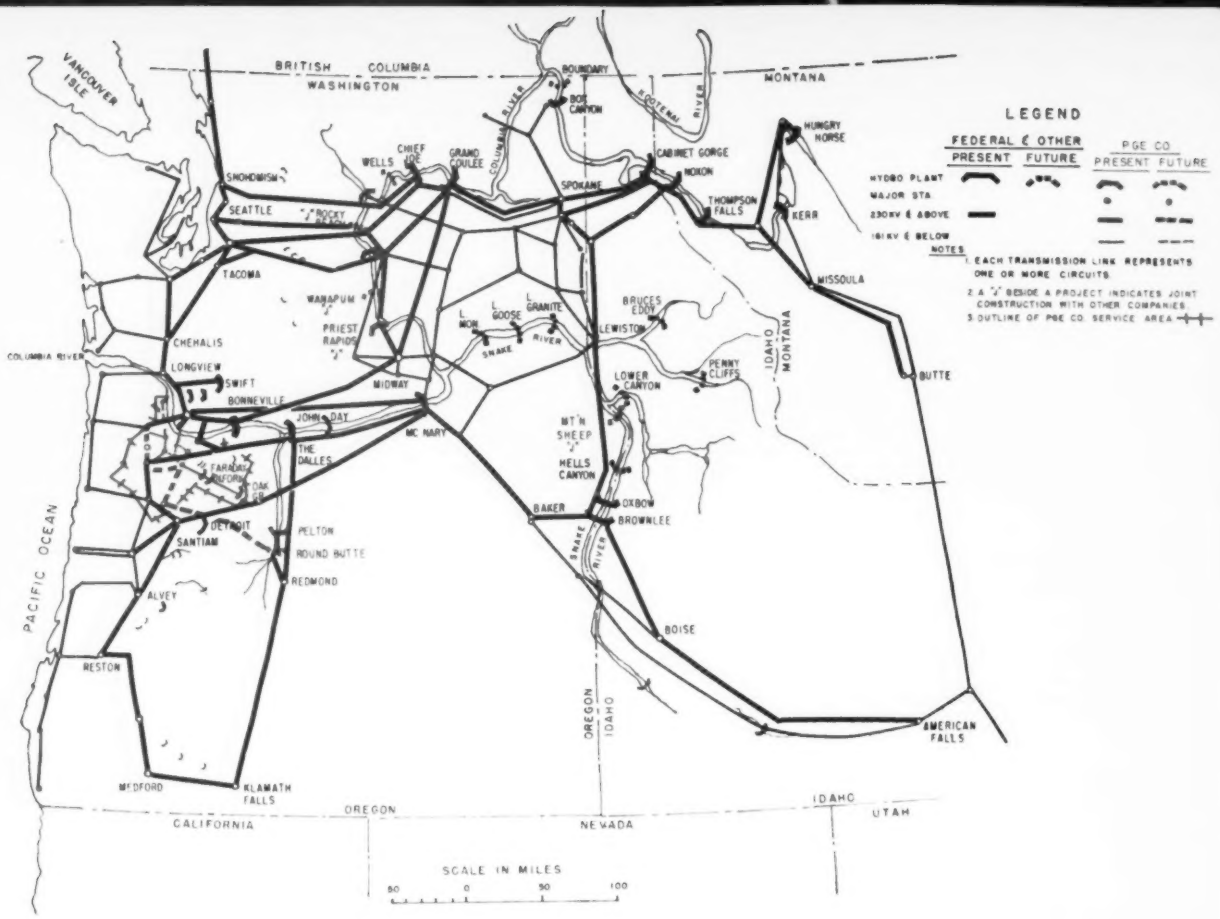
1. Electric heating is economically feasible in most areas in the Pacific Northwest. However, the available rates in the respective areas should be studied before deciding on such installations.
2. First cost of electrical heating installations is usually less than for fossil fuel heating.
3. Better control is normally provided for electric heating.

heating is required less than 10% of the time. In fact, 50% of the heat design is adequate to meet 90% of the annual heating requirement in the Pacific Northwest. When heaters with two elements are installed, it is possible to lower the demand charges materially by taking advantage of the above facts. A three-heat switch in conjunction with a thermostat is one simple solution. A transfer switch to change the heating load from 240 v to 120 v cuts the load to one-fourth the original wattage. Two-stage thermostats will automatically drop one-half the heat load on a temperature rise of one to two degrees Fahrenheit.

Table I—Details of Electric Heat installations in thirteen northwest churches

Type of Heating		Con. Load in Kw	Floor Area in Sq Ft	Annual Electric Light and Heating Bill	Annual Ltg. Htg Cost per Sq Ft of Floor	Annual Kwh per Sq Ft	Design Requirements in Watts Per Sq Ft	Annual Kwh Total	Comments
Battleground Community Church Htg Cbl & Bsbd 40 kw 15 kw		55	3,484 2 floors each	$303.00	**4.35¢**	**4.86**	15.8	33,800	None
Battleground Nazarene				147.51					Well pleased
Emanuel Lutheran, Vancouver, Wash.				300.69					None
Columbia Presbyterian Church, Vancouver Cbl in Clg 11 ft high		70.58	6,321	234.54	**3.72¢**	**3.9**	11.2	27,200	Well pleased
Camas Presbyterian Church, Camas, Wash. Baseboard and convectors		80	15,000	443.00	**2.95¢**	**3.28**	5.3	49,200	Costs less to heat than old oil-heated church half the size including water heating and cooking
Elim Lutheran Church, Brush Prairie Radiant glass tube heaters 10 in. above floor	Required Installed	63 40.66	2,679	365.00	**13.65¢**	**15.2**	23.6	40,600	Satisfactory most of the time if turned on several hours ahead of services. Short of capacity in extremely cold weather, no satisfactory control in nave
Emanuel Lutheran, Longview, Wash. Baseboard	Heating Mx demand	97.98 80.8	8,954			**2.37**	10.9	21,240	Thinks cost too high, likes heat. Uses lower floor 3 days, office and pastor's study continuous
Assembly of God, Longview Convectors	Mx demand	49.2						13,200	Will not repeat on new addition because of high demand charge
First Christian, Longview Cable in floor	Htg load Mx demand	86.71 78.4	7,854			**6.45**	11	50,720	Very satisfactory
Trinity Lutheran, Longview Wall convectors	Mx demand	72						35,920	Heating is satisfactory but would insist on additional ventilation if doing it again
Evangelical Free Church, Longview Cable in chapel, baseboard in classrooms	Htg load Mx demand	35.3 40	5,925			**3.83**	6	22,720	Heating satisfactory. Established high demand in August by turning heating on with lights by mistake
House of Prayer Lutheran, Seattle Cable and baseboard	Htg load	81.34	5,150	745.84*	**14.5¢**	**17.6**	15.8	90,550	None
Community Bible Church, Seattle Cable and baseboard	Htg load	28.8	2,638	26.18	**1¢**	**.291**	11	906	None

* Includes 4—$10 min. after 4/59 min is $14



Further interconnection in the West?
Here are some factors that affect . . .

System Planning in a Pool Operation

D. R. Miller, Portland General Electric Co.

The planning engineer's job is to provide the desired quality of service at the lowest possible cost. In the usual situation, the planning engineer has full control over the choice of alternate facilities. Within a tightly interconnected pool, such is not the case. Each firm decision by one of the pool members can materially affect the plans of every other pool member. The pool operation, to be successful, requires the closest of cooperation and frequent contacts between groups. At the same time, the pool members may be competitive with one another and, in a political sense, differ greatly in their goals and objectives. Often the economic choice is dependent upon the ability to purchase power as contrasted with building one's own plants. The question of wheeling power vs building your own transmission facilities is always at hand. Consideration must be given to the use of reactive supply equipment to achieve optimum benefits from pool operation. These are some of the problems confronting the PGE Co. as it plans an expansion program to cope with increased system demands.

The PGE System

The Portland General Electric Co. served a peak load of 845 mw in January 1959. The company's service area covers 2,600 square miles, with 71% of its load within a 320-square-mile area in and around Portland. The transmission system is made up of about 650 miles of 57-kv and 115-kv lines operated as an intergrated network. In addition, the company owns and operates a small amount of 230-kv transmission associated with the Pelton plant.

Portland General Electric supplies about 30% of its total power from local hydro plants. The balance of PGE's resources are provided in the form of purchase contracts with other pool members and are (or will be) supplied from hydroelectric plants located several hundred miles from the load area. In many instances, the power of these plants is transmitted to the PGE system through federal transmission facilities.

PGE is in the midst of a long term resource development program to: (1) reduce the present exposure to

The Northwest Power Pool

The present pool operation in the Pacific Northwest includes all major utilities. The service area of the pool covers 800,000 square miles spread over five states and portions of Canada. A peak load of 10,000,000 kw is served through some 7,000 miles of 115-, 230- and 345-kv transmission lines. Approximately 100 public bodies are supplied from the federal and privately owned transmission lines throughout the pool area. Large blocks of power are interchanged between utilities over federal and private transmission facilities. The interchange of power between various members of the pool is accomplished through direct interchange, power contracts covering firm and secondary power, and several types of wheeling contracts. The ownership of power resources is divided in an irregular fashion between various members of the pool. The degree of self-sufficiency ranges all the way from those having small amounts of generation and large loads to those with small blocks of load in possession of a large surplus of generation.

The Northwest Power Pool is held together through the desire of each of the participants to achieve minimum power cost by taking maximum advantage of diversity between various load and resource combinations. With pool operation, the whole is greater than the sum of the parts. Thus, the hydro resources located in the western or Cascade range area, while small in magnitude compared with Columbia River resources, are extremely valuable to the pool. The runoff in the Cascade range follows seasonal load requirements very closely, whereas the Columbia Basin plants must depend upon storage drafts to meet winter loads. Thus, pool operation increases the firm capability of the entire area.

steam generation, and (2) provide additional capacity through construction of new plants and/or long term purchase contracts to meet growth requirements and to take the place of dwindling federal supplies.

The requirement for low cost power in the Northwest has resulted in rather keen competition for development of economical hydroelectric sites. With the cream of the Northwest hydro sites already developed, today's best locations are often several hundred miles from the PGE service area. Questions involving fish passage, recreational interests, conflict of interests regarding comprehensive development of power resources must be aired and resolved before a license for construction may be granted. The time required to obtain a license for any major hydroelectric development ranges from two to six years. Actual construction takes from two to five years. These factors dramatize the necessity for long range, firm commitments and farsighted planning.

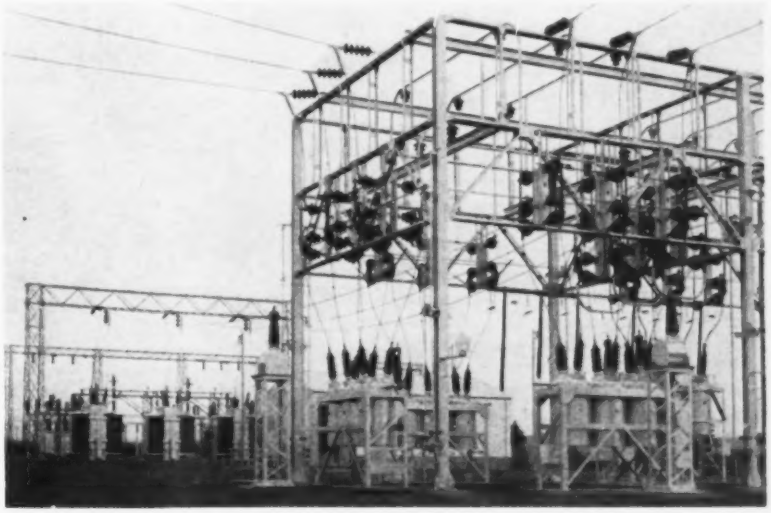
A long range analysis of PGE's system growth and resources to serve this growth has indicated the wisdom of a 230-kv overlay to be superimposed on the company's present 57- and 115-kv intergrated network. The overlay in the Portland urban area will be limited to a maximum voltage of 115 kv because of congestion and right-a-way problems. The suburban and rural areas will be served through the 230-kv overlay, with stepdowns to 57 kv, as required.

Planning the transmission links between remote hydroelectric sites and the urban load centers presents a number of interesting problems—as a result of pool operation. Consider, for instance, the new generating plants in the Northwest that are being developed on a joint basis. The output of these projects usually has to be delivered to widely dispersed load centers. Board studies often indicate electrical flows which have no relation to contract flows. Transmission facilities may or may not exist between the plants and the various delivery points. In some instances it may be desirable to wheel power through existing transmission facilities, while in other cases it might be prudent to build new transmission lines direct to the load centers. **As an example, the PGE Co. found it more economical to wheel the 125 mw generated at Pelton as opposed to building 90 miles of high-voltage line. By way of comparison, the addition of 300 mw of generation at Round Butte, seven miles south of Pelton, will require construction of high-voltage line direct to the PGE load area.** *Normal power flow on this line will be in the order of 300 mw. If and when BPA consummates its integration agreement with California, the power flows on this line could vary all the way from 150 mw to 450 mw.* This presents a unique set of parameters to work with when one is trying to determine the economic conductor size and voltage level for this new circuit.

In other cases, the company might be called upon to wheel power between the two other utilities in the pool. For instances, PGE wheels BPA power through its system to a municipality located near the center of the PGE system. This might seem unusual to the average planner, however this type of situation is rather common in the Northwest power pool.

Reliability

At first glance, it might appear that a system of the large interconnections would have a few reliability problems; but a closer examination reveals a strange paradox. Consider a typical heavy load period. Under this condition, generation plants,



PGE's 125-mw McLoughlin sub receives power from Northfork and Faraday projects

Need for planning shown by Pelton Dam, seven years from license to completion, the result of political problems

company owned, would be operated at maximum capacity. The interconnections would, then, represent the balance of resources for the PGE system. Power flow through the interconnections is controlled by the impedance between the intertie and the load centers, as well as the impedance back to the remote source. Thus, power flow is more or less controlled by the number of lines in service on either side of the fence. From this it can be seen that the planning and operating engineers must not only have a thorough knowledge of the adjacent system, but must be apprised of the effects of any outages of contemplated changes on *either* system. Under some conditions, portions of either system could be seriously overloaded as a result of outages on the neighboring system.

Operation as a pool member produces some unusual flows through interconnection points. For example, certain interties may be operated at maximum loading 24 hours a day—in complete disregard of the load on the PGE system. Furthermore summertime loading may be as high or higher than wintertime.

Reactive Supply

There is an understanding among the pool members that each system, regardless of its degree of self-sufficiency with respect to power supply, must be self-sufficient from the standpoint of reactive supply. Pool members have agreed not to import reactive during peak periods, and they're asked to absorb reactive from the transmission system during light load periods. Under these conditions, large blocks of switched capacitors and/or synchronous machinery must be installed on each system in the pool. In the case of the Portland General Electric Co., the most economical answer to the problem to date has been to install blocks of switched and fixed capacitors at the distribution primary voltage level. These installations serve a two-fold purpose, provide for power factor correction at the interconnections and, in addition, formulate an additional means of voltage control on the feeders.

In some areas, local generating plants are used to fulfill reactive requirements. If these generating plants are adjacent to interconnecting points, their use as a reactive source can become quite limited because of the voltage problems that might be produced on the adjacent system. Thus, installation of reactive supply is dependent upon two factors; local voltage problems and pool requirements.

Long term wheeling contracts include provisions for transfer of reactive from the remote generating plant to the local system of the plant owner. If the local system wishes to make optimum use of this supply, obviously the interconnecting points can no longer operate at unity power factor. This, in turn, means that fewer capacitor banks will be required on the distribution system. Power factor correction and voltage control on distribution feeders may be changed materially by this action. This is an example of how contractual commitments can affect even distribution planning.

Let us look for a moment at the system, or systems, on the other side of the intertie point. In general, this utility is interested in holding the receiving end (intertie point) voltage as high as possible in order to obtain maximum transmission efficiency. The owner of this system might wish to install a large reactive supply on his side of the interconnection point to achieve the desired transmission efficiency. Selection of tap ranges on future transformers at interconnecting points presents an interesting problem when one considers the numerous conflicting requirements that must be resolved.

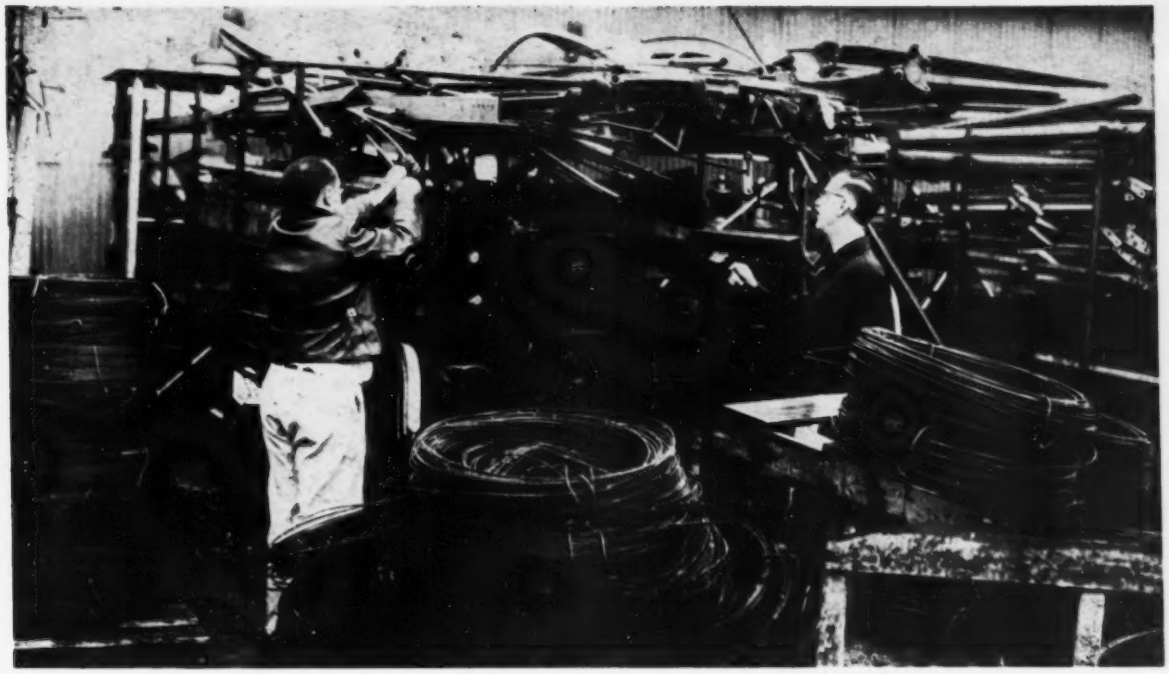
Cooperative Competition

At the present time, the Willamette Valley area is served by the Bonneville Power Administration, two private utilities and a number of small public bodies. In addition, BPA supplies several large industrial plants, as well as large blocks of firm and secondary power to the private utilities, and all of the requirements for most of the public utilities. In some instances, direct competition exists between the public groups and the private utilities. In addition, there is direct competition between the two private utilities in portions of the Portland area. Freedom from tax payments and lack of investment in transmission and major substation facilities enables the public groups, in general, to offer lower rates. Thus we have the various pool members who cooperate completely in the operation of the pool differing violently ideologically and competing vigorously in the market place.

In the face of this situation, the private utility has but one product to sell—and that product is service. This requirement for plus service is a real factor in system planning. Operating personnel are keenly aware of the fact that improved service quality must be the by-word of the utility in this circumstance.

The engineer must attack the basic planning problems on an area basis. He must make studies that often times ignore ownership. The planning engineer must be familiar with the problems of all of the pool's participants with whom he finds himself in contact. This must not only cover the physical problems, but also a rudimentary knowledge of all of the various contracts involved.

Such factors as degree of ownership, joint development practices, power costs, wheeling charges, competition and politics should not be allowed to alter the basic pattern. The result and effect of varying these parameters will be one of distributing the financial investment among the various members of the pool. Final decisions in these areas are a management problem; however, it is the planners' responsibility to see that management has all of the facts necessary for reaching sound decisions.



Public Service employees first check salvage materials from one of the seven PSCo stockpiles before buying new

Colorado Public Service finds . . .

Big Profits in Salvage and Reclamation

In May of 1957, heavy rains and melting snows swelled the Platte River to a point where it threatened to erode away the ground from around one of Public Service Co. of Colorado's steel transmission towers. As the waters edged to within 45 ft of the tower, it was decided to surround the tower with metal piling. Local suppliers were checked; pilings were not in stock. Somebody checked with the salvage office, and the vital metal pilings were uncovered.

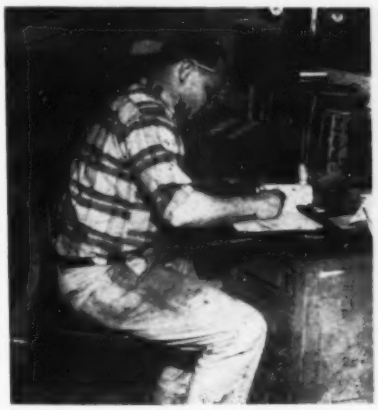
The tower line was saved, and the pilings were obtained at a saving of $7,100.

Just another day in the life of Ken Purfurst, head of the salvage and reclamation department, his storekeeper and two helpers. A penny saved is a penny earned, and these boys make the most of it.

Sorting

The sorting of scrap metal is a tedious job that pays off in higher "profits."

A mixture of aluminum and steel wire, for instance, will sell for 6¢ to 8¢ per lb. When separated, this same scrap can be sold at 12¢ to 16¢ per lb for aluminum and 5¢ per lb for steel. These prices are for clean metal, stripped of insulation and other extraneous foreign matter.



Records show reclaimed or salvaged material saved nearly $75,000 worth of material and equipment in one 12-month period

Insulated aluminum wire, for example, has a scrap value of $2.50 per cwt. Stripped of its plastic insulation, the same wire is worth $12 to $16 per cwt. Even the plastic insulation has value. It can be sold to reprocessing plants at $5 per cwt. An eight-time increase in value for the same material!

Stripped No. 6 or No. 4 aluminum wire can be used on the system as tie wire—and worth $80 per cwt.

The reclamation of rust-incrusted pipe fittings proved to be a bonanza. Purfurst found that by rolling the old couplings in a cement mixer filled with flint sand, the old couplings could be returned to service good as new. Between 100 and 200 couplings are cleaned and polished in this manner in about half an hour.

When the method was first tried, $601 worth of couplings valued at 11¢ to 59¢ each new were returned to stock. From January to September 1958 the saving in reclaimed couplings alone was $13,484.

Transformer Conversion

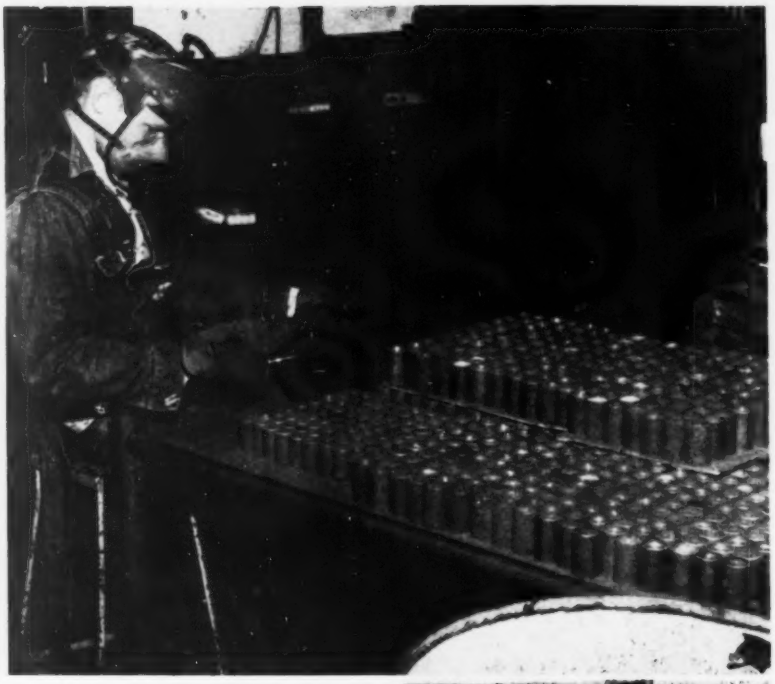
In the process of converting the electric distribution system from 12,000 v to 7,620 v, the electric distribution department found that old transformers could be converted to the higher voltage by their manufacturers at a saving of 20% over the price of new transformers.

In the next four years, some 5,000 rebuilt transformers will be returned to service in the Denver area at a saving of $375,000.

Pole Reclamation

In January 1958 a new procedure for reclaiming power poles was instituted by the line construction department. Old poles, which were formerly discarded owing to weathering shell rot or other types of damage, are now inspected for possible reuse and those that can be reclaimed are sent to an outside company for treatment. Unusable poles are sold for 10¢ per ft. Where a pole can be reused, there is approximately 50% saved over new pole prices. The cost of a new class 4 50-ft cedar pole, for example, is $41.85; the cost of a reclaimed pole of the same grade is $20.40. In the first nine months of the new program some 1,150 poles have been reclaimed at a saving of nearly $18,000.

The secret of a salvage operation's success is close cooperation between departments. Before new equipment is purchased, a check of salvage stockpiles is made to determine whether or not the item is in salvage stock, or if a suitable substitution can be made.

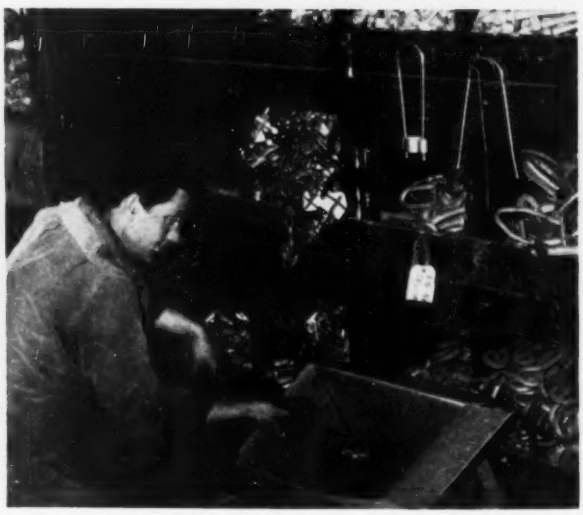


A Public Service Co. employee puts the finishing touches on part of $13,484 worth of reclaimed couplings. Right: Marvin Marsh fabricates a pole stop bracket from used metal for use in the pole storage yard

A gross profit of $75,000 for a 12-month period last year justifies the salvage department's operations. This figure is exclusive of the electric distribution department's savings in transformer rebuilds and the line construction department's savings in pole reclamation.

As the man said, a penny saved is a penny earned.

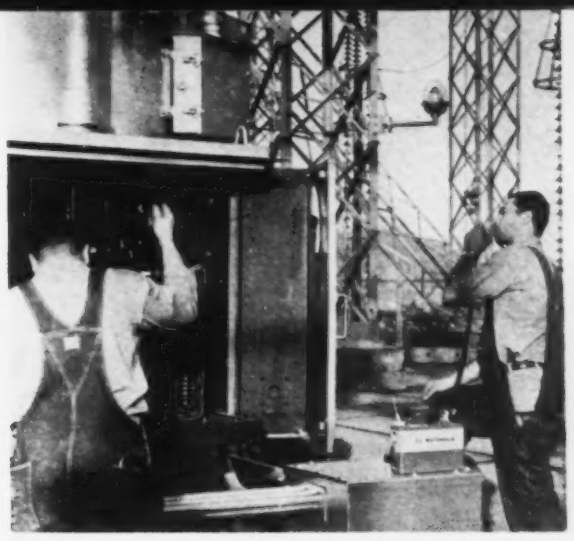
Left: Ken Purfurst uses a machine of his own design to strip insulation from scrap aluminum wire, increasing the value.



Right: Cable connectors that have been reclaimed by the department are sorted and placed in appropriate bins

Here's how BPA uses mobile radio to . . .

Speed Dam Maintenance



Maintenance men use portable radiophones to check circuit breakers. On this job radio saves time and labor, adds to safety factor

Communications between two men working 100 ft apart do not appear too difficult. But when one of these men is in the flotation chamber at the bottom of a Bonneville Dam navigation lock miter gate and the other is at a motor on top of the gate, a problem in communication between the two results. The only successful method has been two-way radio.

By equipping the two maintenance men with portable two-way radios, the confusion due to lack of communication has been eliminated and the time needed to perform the job has been reduced 66⅔. In addition, the machinist at the pump in the bottom of the flotation chamber may communicate directly with the machine shop tool room to order tools or discuss special conditions and receive instruction concerning maintenance.

This instance is just one example how the Bonneville Dam radio system has increased the efficiency in dam maintenance. The project maintenance crew consists of 95 employees. Four boats, eight pickup trucks, a large flatbed truck, two dump trucks, a combination gravel loader and rotary snow plow and three mobile cranes make up the maintenance vehicle complement.

Prior to the installation of the radio system, the only method of communication about the area was by stringing wires and using telephones. In various instances, passing messages and written notes was necessary. Contact with radio began with the leasing of two radio units for use on a job requiring the services of a mobile crane. This was a case where a crane operator could not see the man attaching the rigging. The use of a radio eliminated the danger of misunderstanding signals relayed through a third party.

This first experience with radio, arranged by Dave Larsen, the electrical engineer on the project, proved to be so successful that installation of the entire system followed. The system as it presently stands consists of two base stations, five mobile units and three portable radios. All the equipment operates on a frequency of 163.425 mc. The network is divided basically into two parts. One base station and one mobile unit are used by the security police. The base is located in the security guard control room at the main entrance gate and the mobile unit is in the guard's prowl car. The second base station is equipped with three remote-control consoles. One remote console is in the engineer's and superintendent's office, another is in the control room and the third is in the tool room. The latter is used by the regular dispatcher, Ed Burkhardt. The other two are used as needed but do not continuously monitor the channel. The remaining mobile units are installed in the project engineer's sedan, and pick-up trucks used by the three major maintenance crews —the machinists, the riggers and iron workers, and the electricians. One of the handie talkie radios is used by the security police and the others are used by any of the maintenance crews whenever the need arises. These portable units are used by men on foot and in special equipment, such as boats, heavy trucks and cranes. All mobile and base units provide 25-w rf output. The portable radios provide 1-w output. The system covers the area and reaches the dike 35 miles up the Columbia River.

The radio system is available to anyone that has a use for it. Larsen has invited the men to think of new uses for the radios and to use them any place they provide faster, safer job completion. It is estimated that 85⅔ of the men have used the equipment in one way or other.

Some Examples

To move the floating debris from the bottom of the dam, it is necessary to adjust the flow of water by sequentially manipulating controls at 10 stations. One man observes water level and the action of the floating debris. Prior to radio, he would shout to a relay man at a telephone who in turn would call in directions to increase or decrease water flow at certain numbered stations. Because of this cumbersome method of communication, many attempts would have to be made to move debris from the dam. Now the man in charge carries a portable radiophone. He can speak directly to the control room. This instant communication gets rid of the debris at the first attempt with a resultant 50⅔ saving in time and manpower.

During the job of testing circuit breakers, the electricians' crew increases productivity 50⅔ by being able to communicate directly with each other with the portable two-way radios.

On certain jobs the machinists save up to 50⅔ of their time by being able to call for special tools and materials with no delays.

The riggers' and ironworkers' foreman says that with radio he is able to split his crew into as many as four groups since he can efficiently supervise that many jobs through the use of radio communication.

In summary, Larsen says, "Any maintenance that is performed requires communication. Two-way radio to us is not an emergency device, nor is it a form of insurance to us who use it. It is a tool to be used by all who need it."

Motors and Controls—V

To Get More Torque

Tom Hughes,
Electrical Safety Engineer, California Division of Industrial Safety

These three elements of the rotor winding reaction (the resistance, the inductive reactance and the varying frequency induced) have been manipulated by various designers in almost countless schemes for overcoming the many load or survival problems. Since the frequency of the induced current in the rotor winding has to go from the stator line supply frequency to a small fraction of this, as it accelerates from standstill to running speed, and the inductive reactance of the rotor winding is more accommodating to one frequency than another, this combination of circumstances is helpful in many solutions.

On the other hand, if starting torque is the prime problem, the simple employment of high resistance may be the answer. While disposition of the many factors involved in rotor design is a complex subject, we can make a simple statement that the production of torque varies in fairly direct relation to the amount of resistance presented by the rotor winding. If the nature of the load is such that the motor seldom runs at full speed (like a machine shop hoist or a passenger elevator) and recurrent acceleration is the main problem, a high resistance rotor winding could satisfy the need.

But, naturally, high resistance is not conducive to efficient utilization of electricity and it is absolutely avoided in general purpose motors. On the other hand, there is a class of motor known as a "torque motor," used on such loads as hose reels or crane trailing-cable reels. This motor can be pulled in the reverse direction while it is continuously trying to go forward, with no harm or overheating. Its rotor is packed with resistance but efficiency is completely abandoned to accomplish its special purpose.

In most cases we can't afford to throw efficiency out the window so we arrange for manipulation of the factors that produce the results we want. By accepting some minor compromises we can design a motor that starts with high resistance but drops it as it picks up speed. The simplest way to accomplish this is with deep narrow slots in the rotor core and a single alloy bar in each slot.

The nature of the reactance (with the longer magnetic circuit around the deep slots) is such that, at the higher starting frequency, all the flow of current is forced into the edge of the winding bars at the outer periphery. This presents considerable resistance to the flow of rotor current and the desired higher torque is achieved. Then, as the rotor picks up speed and the frequency settles down into use of the full bars, with consequent decrease in resistance for running.

Double Cage Rotor Principle

Of course, this can only be accomplished by compromising other important features of rotor design. The same objective is accomplished with more refinement by using two layers of winding (two cages). The alloy of the outer cage is chosen to produce a high resistance as a starting winding. The alloy of the inner cage is a normal, low resistance metal. By the same principle as the "deep slot" class, the high frequency at start produces reluctance to any flow of current in the inner cage. Thus, all the current flows in the outer high resistance winding 'til the reluctance diminishes with the frequency at running speed.

Both the deep slot and the double cage rotor principles are used in many variations for the motors in code groups from A to E and the different design classes. In all cases of squirrel cage rotors within the normal diameter range, these windings (slot bars with connecting rings at each end) are poured from a molten alloy.

Forty years ago, the squirrel cage was made up with copper bars slid through the slots and then riveted to copper rings at each end. Since they had to be slid in, they were loose and depended on wedging to prevent vibration. Gradual deterioration of wedges occurred and a noisy motor resulted. This vibration destroyed slot linings, loosened the connecting rivets (producing poor joints), and in some cases actually built up a hard, lacquerlike insulating coating in the joints of the shorting rings. Another disadvantage was that the resistance of the winding could only be altered by the size of the copper bars.

In the twenties, manufacturers started pouring alloys into a form which produced the winding (in the slots) and the end rings. At the same time, the fan impellers were cast on these end rings (from the same metal), thus producing a perfect getaway for the heat in this cage winding. Since the bars were cast in the rotor slots, a perfect fit (with no vibration) was produced for all time. Furthermore, the same slots could be used for different degrees of winding resistance by varying the alloy characteristics instead of the size of copper bar.

But all these resistance-vs-reluctance setups are accomplished with compromises in other directions. The nicest solution to problems of starting torque is to build an ideal rotor and winding and then vary the winding resistance with exterior controls and resistance elements. This, of course, is accomplished with the wound-rotor (slip-ring) class. Before the days of the poured alloy cages, the wound-rotor motors were used in most cases where starting a heavy load or overcoming great inertia was a problem and expense was not so important. Today, wound-rotor motors are used only in applications where continual variation of speed or accurate spotting of loads is important (as in traveling cranes, for instance).

There was another method of starting the large squirrel cage motors, with the copper bar windings, that became very popular. It was known as "reduced voltage starting" but it not only reduced the voltage; it reduced the current input to the stator and consequently the torque developed by the rotor. This meant that the motor must be allowed to start under light load. In those days, the majority of motors drove line shafts or machinery that could be started without load.

► **Mixed-Up Neutrals**—To prevent connection to the wrong neutral wire of two systems of different voltage (such as 120/240 or 120/208 and 277/480 v) Portland, Ore., now requires use of a white wire having a red or black stripe for the 277/480-v system to differentiate such a grounded conductor from the grey or white of the lower voltage system, regardless of whether the two systems are run in the same raceway.

Organized for Big Work

Answer to the question—"How do they handle such big projects all over the nation?" is to be found in how thoughtfully Wismer & Becker, Sacramento electrical contractor, has organized department in its new office, warehouse, shops and yard at 7820 Folsom Blvd.

Certainly many big jobs are to their credit — the power plant at Chief Joseph Dam, five Feather River plants for PG and E, a pumping plant at Niagara Falls, the new Sheraton-Portland Hotel and many others.

Basically the organization is wrapped around the triangular table shared by partners Ed Wismer and Hugo Becker in their 200-f-c lighted central office. Accounting and bookkeeping offices range on one side of the triangle; those for engineers and estimators along another; and the twin large shops (motor repair, auto maintenance, and pipe and mechanical) and warehouse and yards the other. All office and shop equipment is the most efficient, as are field tools and handling equipment. Unique is the company's own motor vehicle repair and maintenance shop for its 60 trucks and cars; the tool maintenance shop; the use of 277-v lighting both fluorescent and incandescent throughout; stocks of wire, conduit and electrical fittings greater than many distributors; use of fork lift trucks and cranes to handle equipment. Office-equipped house trailers make efficient field offices.

Hugo Becker and Ed Wismer share office and this work table as operation center

Steel shelving, hardware rotating bins, cable racks, tool shop of the warehouse

All tools returned from jobs, are checked and reconditioned

Forklift truck finds a variety of uses material handling

Dining and family room has dimmer controlled color ceiling spots and valances

Entire periphery of living room has a

Tiny lamps in plastic reflectors rim the make-up mirror in Mrs. Ferguson's boudoir

San Diego Idea Home

Whatever electric service or device or feature anyone has dreamed of is to be found and in daily use in the phenomenal home that the Fergusons', not Blanding, have built on Point Loma, San Diego. Primarily it is to live in—electrically. But Norman Ferguson, president of California Electric Works, San Diego, and his wife freely show it to all who would see as a return to the industry that provided its comprehensive electrification. It is an idea chest, loaded with possibilities for home electrification that others can see, copy, adapt or even improve upon, if possible. It has that effect on its visitors, more than 2,000 already. They go away with ideas for improving their own homes.

The modest looking three-bedroom house employs examples of every type of home lighting, indoors and out. It has applications of every type of electric heating. It uses every type of wiring method. Every means of lighting and appliance control is used for every possible application.

Complete sound and intercommunicating facilities are provided.

Besides every appliance, kitchen has sound and appliance center

Each of two girls' rooms has TV beside well-lighted study desk

valance. Outside soffits light draperies

Downstairs recreation, lighted garden adjacent, provide a variety of lighting

Leads to the Future

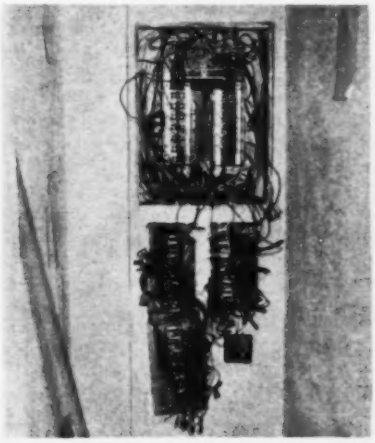
As an example of business building thinking, the two-car garage, besides radio beam controlled door, has three fluorescent strips parallel to the hoods of the cars and two duplex swivel units at the rear, where the average garage has one poorly placed light. Ferguson has sold more visitors on relighting garages by showing how shadowless seeing under the hood or into the trunk can make living better.

The same philosophy is applied throughout. Every conceivable use was anticipated and provided for, not that it will be used by all but it may be just what somebody has been needing—and there it is. In that sense it is a research house, a proving ground. As Ferguson told his fellow contractors at the NECA Tri-District convention at Glacier Park, "The community has a right to expect new services, new products from us." It is in that promotional spirit that this extraordinarily completely equipped electric home was built and is being used.

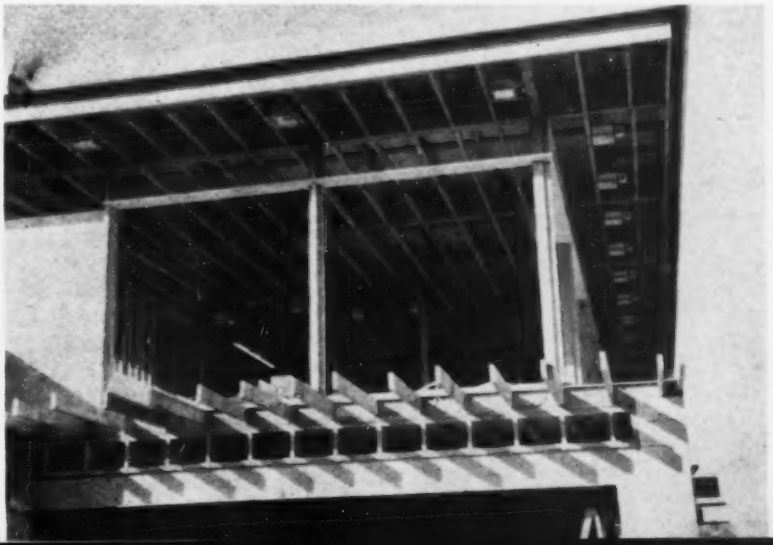
Its Gold Medallion is set in the concrete of its front entry.

Norman Ferguson at 400-amp main panel

One of three lighting and relay centers

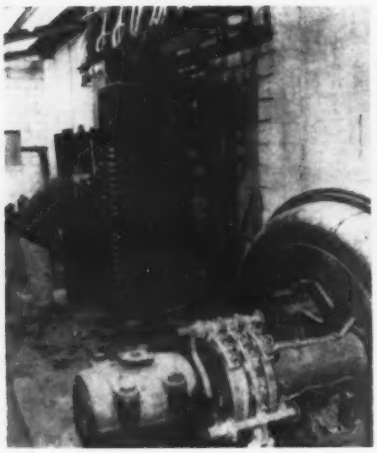


During construction—soffit lights around the house outdoors; ceiling spots indoors



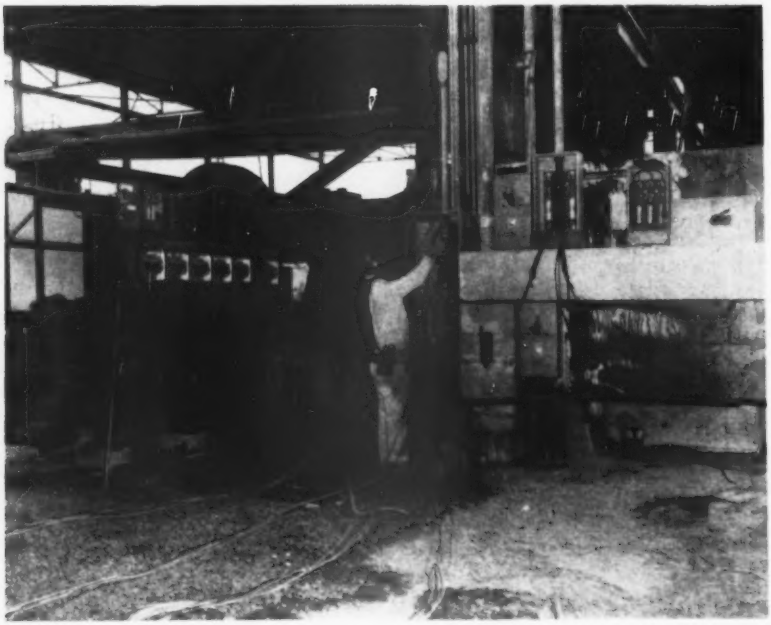
Un-wiring a Steel Mill

Identification tagging and coding all circuit wires and conduit for shipping



Checking 1,000-hp motor drum controller

Cleaning, then preservative-coating motors



Removing wires from distribution center and control pulpit for tagging, boxing

Wiring a building or plant is no novelty but certainly unwiring one is. But such a unique experience was afforded Northwest Electric Co. of Seattle last month. It was selected by Howard International Inc. of New York City to dismantle the entire electrical system in the old Seidelhuber Rolling Mill at 5280 Marginal Way, Seattle, for shipment and reassembly in Istanbul, Turkey.

Greatly in need of factory facilities, the Turkish government had bought the entire Seidelhuber plant, idle since the war when RFC closed it. Howard International had been commissioned to dismantle it and ship it complete and there reassemble it for Turkish industry. An additional rolling mill is to be built and to produce bar stock and flat stock so much needed by Turkish fabricators. The Turkish government is running a 3,450-v line from Ankara to Istanbul to feed the plant, which will be located on the sea.

Col. John R. Waugh Jr., an experienced old Marine colonel, now chief engineer for Howard International, came to Seattle to get the job done and the ship (loaded with the complete plant in pieces) on its way by Aug. 1. Work started May 7.

From an electrical standpoint, the job consisted of testing each piece of equipment, tagging it, removing it and bundling or crating it ready for shipment. All exposed metal subject to corrosion had to be cleaned and coated with a preservative.

Largest piece of equipment was the 6,900/220-v electric furnace transformer, pictured on the contents page. It had to be put on skids and crated for transshipment.

All motors were opened, checked, cleaned and coated for shipment in a temporary shop on the site.

The work was put in charge of Robert Smith, foreman, by Kernan Dennis of Northwest Electric Co. The work was done with the original plans, which had to be adjusted to show changes made since the original layout. Smith will go to Turkey to assist in decoding and supervising the re-installation of all of the wiring and electrical equipment, motors, controls, distribution centers, etc. The work itself will be done by Turkish labor under his supervision and that of world-wide experienced Col. Waugh.

ELECTRICAL WEST
Construction News

For
- -contractors
- -consulting engineers
- -lighting engineers
- -wiring designers
- -distributor salesmen
- -all interested

Southern Nevada Chapter, National Electrical Contractors Assn. at Las Vegas, has a new manager with a similar name to former Manager H. E. deVilliers, who is now assistant field director of District 5, at Fort Worth. He is Albert Viller, seen at right with D. A. Farr, governor.

Viller and Farr

A strike by any other name is still a strike, and Sacramento had just that before settling for a two-year 50¢ package, payable 12½¢ every six months. Negotiations dragged over the July 1 expiration date 15 days. To be submitted to the council is the sticker-whether Marysville remains a dispatch point. Work at Beale Air Force Base will cost $7 a day instead of $2 travel pay if it is eliminated.

Los Angeles Chapter, NECA, also after extended negotiations, plus some slowdowns, settled for a two-year, 50¢ increase, 25¢ each year. . . San Luis Obispo area settled with Local 639 on a three-year contract for a total 55¢ increase, 10¢ each six months for 2½ years, 5¢ the last half year. This would bring the area up to the San Francisco Bay area level. Santa Barbara was holding out for 25¢ per year. . . Kern County local turned down NECA's offer of 15¢ July 1 and 20¢ Jan. 1 and the case may go to the Council. . . The Fresno independent association received from the council the same rate the NECA Chapter had negotiated.

Gene Ridenour

Gene Ridenour (at right), who succeeded Doug Ellis as the coordinator of apprenticeship training for Northwest Line Constructors, moderated a panel discussion on a needed subject-the starting of some foreman and supervisor linemen training at the NECA Tri-District meeting.

Peoples and Bell

Unfair labor practices suit against IBEW Local 77 and the Pasco-Kennewick Building Trades Council was filed by J. A. Jones Construction Co. for striking at the AEC's Hanford works because the AEC had awarded a $9,415 line contract to Estep Line Construction Co. employing non-union men. Jones charged the strike a secondary boycott.

A bid depository modeled after that in Bakersfield has been set up by an independent corporation in Spokane for the electrical and mechanical trades.

Washington State's amended contractors licensing and inspection law is now being put into effect by the new supervisor of safety, Ralph W. Peoples, and Chief Electrical Inspector R. W. Bell (at right) with nine inspectors. They hope to double the force now that annual licenses have been increased from $50 to $75 and permit fees of $2 can be charged under the new law. Rules will be revised, Bell said, when the 1959 NECode comes out this fall.

San Mateo Electric Club

From contractor to utility goes the presidency of the San Mateo Electric Club. Seated, Bill Hilton, PG and E, the new president; Mike Wright, Ets-Hokin & Galvan, past president. Standing: Lou Rolla, Coast Electric; Ira Collins, state inspector; W. H. Diederichsen, IBEW 617 manager, and Sil Chiappari, North State Electric Supply, directors.

Governmental agencies' "do-it-yourself" policies would be limited and maintenance, alterations and construction better defined in a bill now being proposed by the NECA chapters in the Northwest. It might serve as an accurate guide for the agencies not to overstep the lines.

Friendship Lanterns, 1,085 of them, a post light with automatic light cell control, were sold by Pacific Power & Light Co. and installed by contractors throughout the system in a two-month campaign. Yakima area sold 344, and ranked top. Customers pay for them and wiring on time.

Bearded McConnell

Bearded electricians installed the most modern luminous ceiling for the Oregon-Columbia Chapter, NECA, booth in the Oregon Centennial International Trade Show in Portland, now going strong. It was a real rush by 38 electrical contractors and all available electricians to get it open on schedule. NECA's booth demonstrates good lighting and wiring. . . Below, Stan Adams, president chairman, and Bill Tate, PGE instructor, with 20 graduates of the commercial sales course the chapter conducted.

Sacramento County has announced a relaxation on demand factors for feeders where four or more fixed appliances in addition to a range are connected and where more than five automatically controlled electric space heaters are connected to the same feeder. Recorded tests last winter in electric apartments showed peaks less than feared.

Oregon grads of job management

Looking forward to another proud year, Past President L. F. Hickernell welcomes J. H. Foote to the presidency for '59-60. H. R. Loew, convention chairman, looks on

AIEE Summer and Pacific general meeting celebrates . . .

Seventy-five Years of Service

The Summer and Pacific meeting of the American Institute of Electrical Engineers held in Seattle proved to be the highlight of 75 years of technical service to the industry by the 52,000-member founder society.

Anyone looking at the program could not deny that this 75th year program was indeed a prelude to the future. Side by side with topics of transmission and distribution were discussions of space vehicles and a variety of exotic new instruments and techniques for the space age. Even pressing social problems—rapid transit, for instance—played a significant part in the meeting which brought the nation's leading transit equipment into conference to discuss the form and shape of future rapid transit systems.

Many a utility engineer chortled with some of the erudite topics under discussion only to reflect that today's microwave systems and time-saving computers are the fruits of bushy brained papers of a few years back. In truth, the electrical power industry can look forward to a rich heritage of inherited knowledge in the new areas of scientific endeavor.

Foote Takes Gavel

L. F. Hickernell, presiding at the annual meeting, turned over the president's gavel to J. H. Foote, chief engineer of Commonwealth Associates, who will direct the institute's activities during the 1959-60 season. Western vice-presidents newly elected included Max H. Kight, chief, Electrical Branch, U. S. Bureau of Reclamation, Denver, Colo., and George T. Harness, associate dean of electrical engineering, University of Southern California.

Foote, a member of the Institute since 1918 and a former vice-president of the institute, has a long and distinguished background in technical and professional engineering society work.

President Foote in his response indicated his confidence in the activities of the institute on the sections level to go forward under their own steam. He indicated that the forward looking program for inter-society collaboration initiated under President Hooven's administration and enhanced under Presidents Coover, Barrett and Hickernell would go forward under the efforts of these and other dedicated men in all branches of engineering. President Foote said that he hoped to work with faculty, student and younger engineers in an effort for them to better understand and appreciate the missions of the engineer as compared with those of the scientist. Taking recognition of the tremendous increase in popularity of the special industry technical con-

L-R B. M. Cain, Lamme medalist P. B. Alger, medalist Sterling Bechwith, L. T. Rosenberg, medal historian Mark Princi

ferences, President Foote indicated a desire to attend all, or nearly all, of these conferences to give his personal support to these activities. He feels that the present popularity of these special industry conferences is a natural consequence of an industry which must now specialize in many fields in order to go forward.

As a high point of the meeting district student prizes were awarded to a trim looking crop of engineering juniors.

General Electric's Mark Princi introduced the Lamme medal award with a brief history of the medal. The award was presented to Philip L. Alger of General Electric Co., a noted engineer and inventor, and to Sterling Beckwith, a consulting engineer of Lake Forest, Ill.

Engineers in Management

Some key remarks regarding the role of the engineer in today's industrial society came from L. A. Wood, vice-president of Boeing Aircraft Co., when he said, "I would like to urge that all engineers give more thought to their management tasks at whatever level they may be assigned. I see no reason why engineers cannot be as skillful in working with people as any other group. Nor do I see that this technical and scientific knowledge need be in conflict with a real appreciation of *time* and *cost*. I would like to say, 'Let's have more engineers becoming competent business managers.'"

The full program of field trips and social events and the whole "in hand" tone of the convention spoke well for Hank Loew, convention chairman, and a host of committeemen. John Nelson, district 9 vice-president, and G. D. Jorgensen, Seattle section chairman, could well be proud of the showing made by the Northwest to representatives from other parts of the country.

Editor's Notes and Trends

INSULATING MATERIALS—Polyethylenes and new chemical insulations are having profound effects in the cable and equipment insulation fields. The new insulations will tend to increase operating temperatures over the long haul, but on the short hauls will be felt as more compact, more reliable equipment. Look for real changes in products and practices as the new chemicals come into play.

HIGH-VOLTAGE TRANSMISSION—There seems to be new life in the transmission field. 345 and 460 kv being viewed with much less awe. Some good papers on bundle conductors, high-voltage hardware, relaying and protection at higher and higher voltages.

Americo Lazzari shows loading slide rule

DISTRIBUTION—Perhaps nothing to say, but the dearth of fundamental papers asks the question whether this is an area going by default.

SYSTEM PLANNING — Good sessions. The studies of system planning by operational gaming methods discussed by J. K. Dillard, Westinghouse Electric, and H. K. Sels, Public Service Electric & Gas Co., merit a long look from every utility operator. P. G. Lubisich, with his paper on economy billing with Dr. Kirchmayer's comments, shows a technology developing that will support future, larger pool operations.

Frank Lawson discusses system planning with H. K. Sels, J. K. Dillard

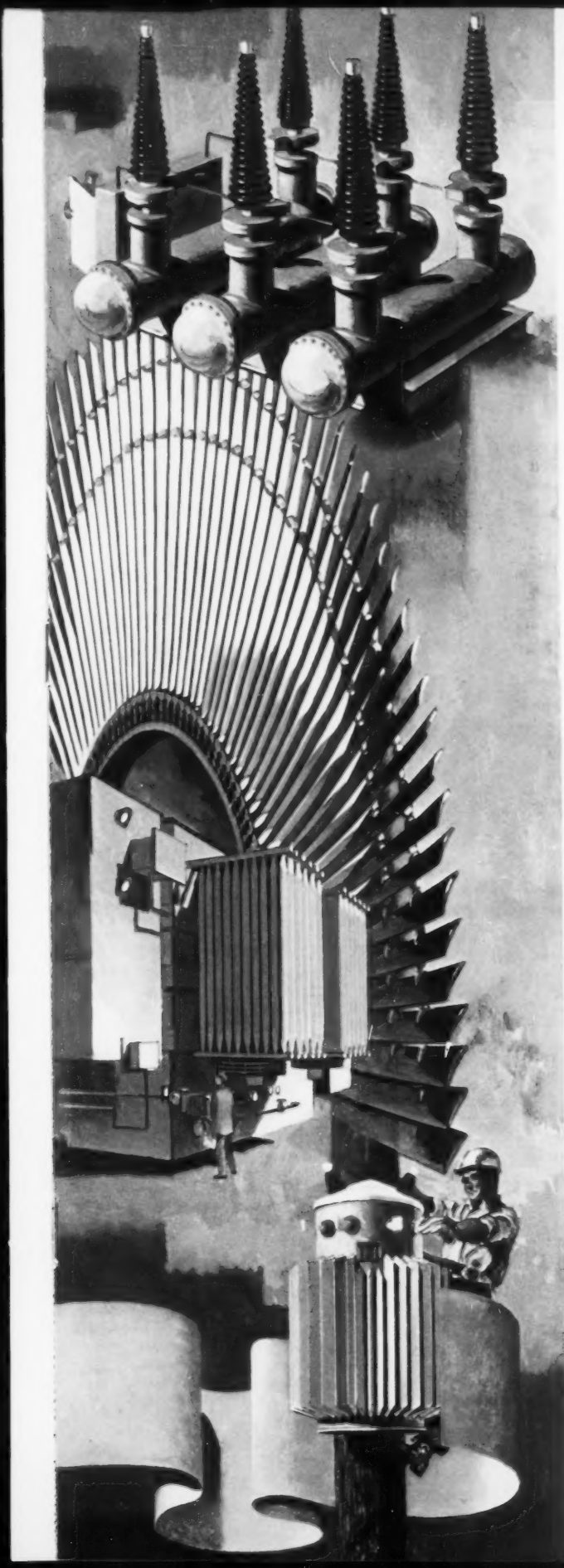
RAPID TRANSIT — The importance of electrical technology and the success or failure of future transit systems made clear. A big question? Is there enough joint planning between power utilities for ultimate full use of rapid transit rights-of-way?

INDUSTRIAL POWER SYSTEMS —A fine paper by Henry Clay on electrical distribution in British industrial plants, but a tremendous shortage of comparable articles on electrical distribution problems and practices in American industrial plants. Surely a general meeting warrants fuller treatment on this important subject.

P. G. Lubisich presents his thoughts on economy billing in a pool operation

ELECTRICAL SAFETY — The paper by L. D. Price on electrical regulations in the United States, Canada and Europe, and C. F. Dalziel's paper on three-wire receptacles very worth-while.

Pirates josh with John Nelson, District 9 v-p, Al Pollard, Past President Hickernell (seated)



on the way from WESTINGHOUSE products for your supersystem

Spectacular growth in utility loads in the 1960's and 1970's is certain. Over one and a quarter trillion kilowatt hours is the power market projected for 1969. To produce energy on this scale will require a generating capacity of 295 million kilowatts . . . more than twice today's capacity.

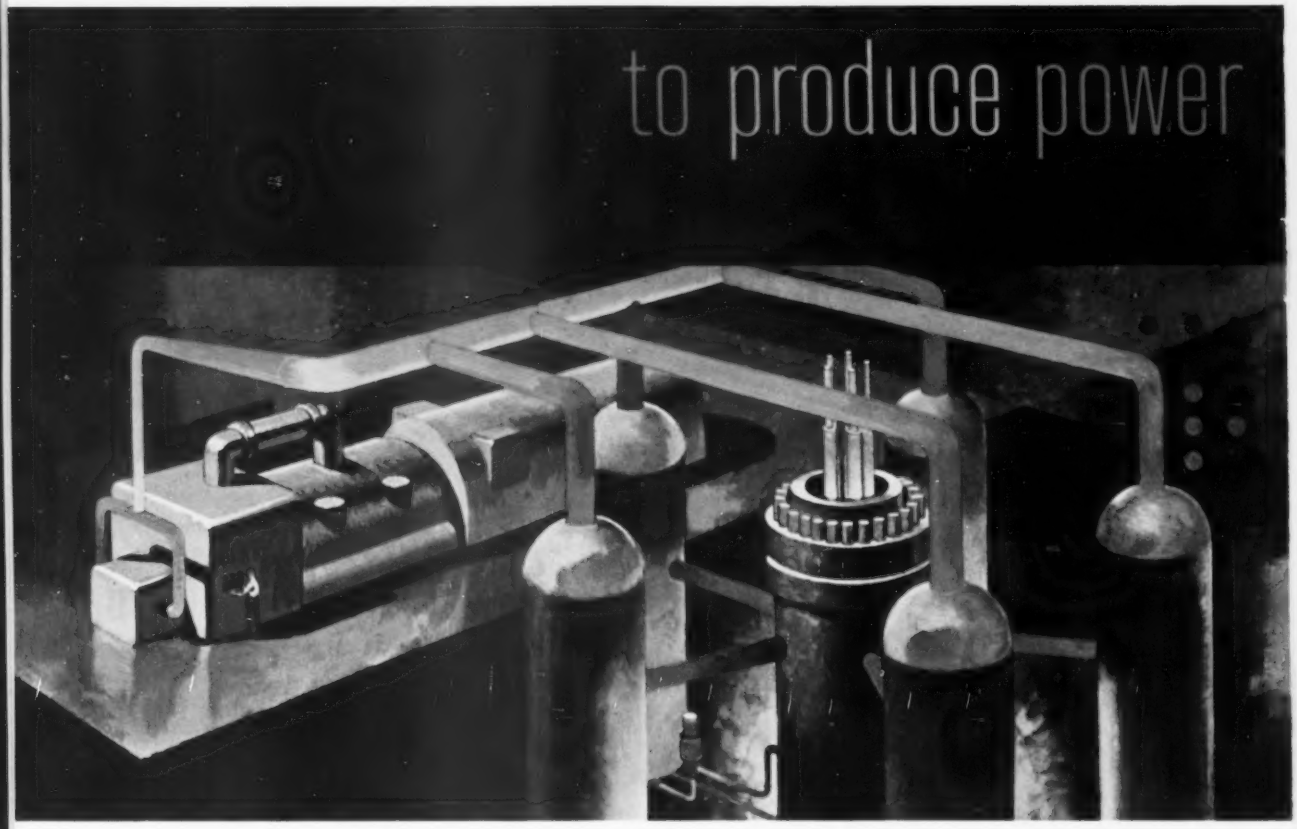
What is the pattern of your future system?

In the era of the superload, the supersystem will emerge . . . complex beyond anything seen or experienced to date. Heavier demands on our fossil fuels will necessitate many nuclear power plants. Your generating stations may be completely automatic. To move bulk power economically, you will transmit at higher voltages. To handle system peaks, you may be sharing capacity to a greater degree than ever with neighboring systems through interconnection. Doubled distribution voltages may be your only answer to meeting residential loads.

Westinghouse can bring you the products you will need to meet these requirements. Westinghouse has built some of these products. For the others, basic design and engineering work has been completed. Read this story on the following seven pages.

WESTINGHOUSE

is ready today to build products



Westinghouse is now ready to build a 330,000-kw nuclear power plant

Westinghouse offers this nuclear generating station for service on your system in 1965. This plant will compare in capacity with the largest fossil fuel plants required to meet present standards of economical generation. Power cost? Competitive with fossil-fueled plants in some areas of the country today.

Through comprehensive evaluation of dozens of possible reactor designs, Westinghouse has concluded that no one nuclear power plant is ideal for all times, or every utility power need. The most promising reactor types are currently under intensive development. For generating stations of the size now being added to utility systems, the pressurized water reactor is the only nuclear plant sufficiently advanced and proved to be offered for immediate construction.

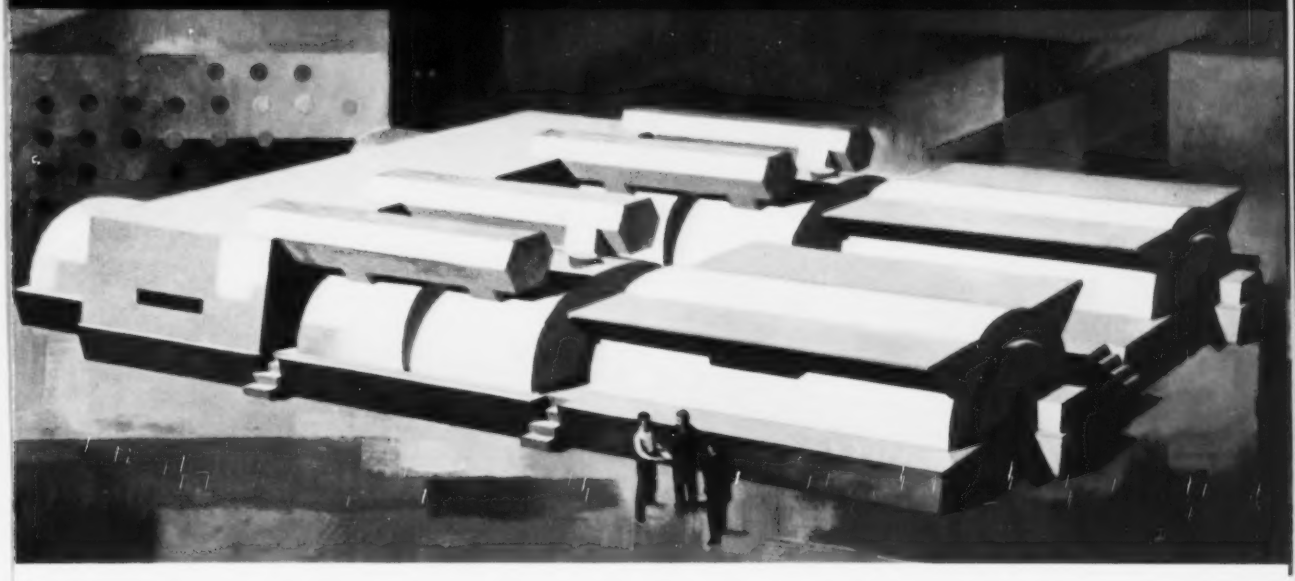
This plant is a result of the $40 million nuclear power investment by Westinghouse to make world-wide power generation from the atom practical, economical.

Westinghouse is ready to build unprecedented 800,000-kw turbine-generator now . . . almost twice the capacity of the world's largest today

From Westinghouse research has come a new 28-in. exhaust end blade capable of 25 percent more power than any that have preceded it. Cross-compounding with four exhausts on each of two 3600-rpm shafts, this blade makes possible an 800,000-kw turbine-generator unit. Here is tomorrow's turbine-generator

for your future system

Experience to understand total system operation . . . For decades, a special staff of engineers at the Westinghouse Electric Utility Engineering Department has been applying a bold mixture of technical knowledge and imaginative thinking to broad system problems. From long-range studies, basic concepts of power systems of tomorrow are being created.



to supply massive amounts of low-cost, dependable electric power to a growing American economy.

Another turbine-generator of tomorrow is already in production at Westinghouse. The highest pressure, highest temperature turbine ever undertaken is the 1200° F, 5000-psi unit for the Eddystone Plant of the Philadelphia Electric Company. Because temperatures in this range are far beyond the capability of ferritic materials, this turbine uses austenitic alloys. Over-all station heat rate will be about 8100 Btu per kwhr—the most efficient in the world. This machine will produce 10 percent more power from the same amount of fuel than any now in operation.

Efforts to wring more and more power out of a pound of coal do not end with these giants. A combined gas-steam plant is coming. The same combustion source provides steam for the steam turbine and heat for the gas turbine. Result? Higher thermal efficiency.

With two outstanding breakthroughs, Thermalastic® insulation and Inner Cooling, Westinghouse generators have kept—even exceeded—the pace of power generation needs. A 384,000-kva generator is being built; even higher ratings are in the offing. Generators can be built now to match any turbine that can be built, any system plan that can be devised.

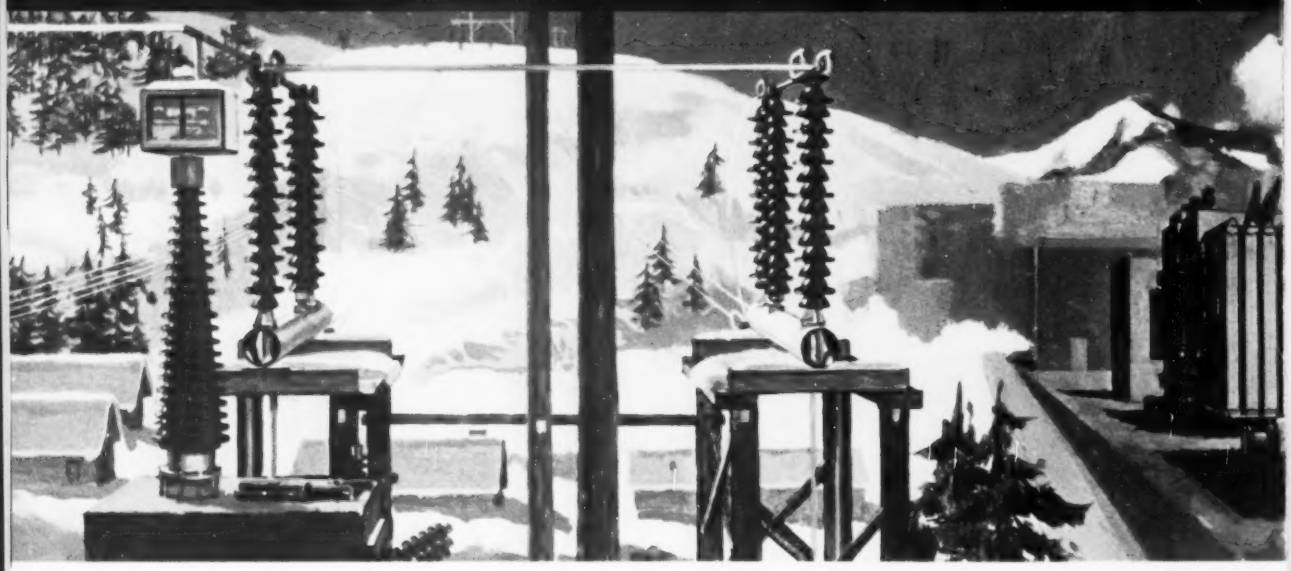
This generating equipment can be built now, because for years Westinghouse has plowed earnings into research to insure the future of the electric utility industry.

YOU CAN BE SURE...IF IT'S **Westinghouse**

WESTINGHOUSE

is ready today to build products

to transmit power



Westinghouse is ready now to build power transformers for 690-kv systems

The great hinge on which the design of transformers of the future swings is extra-high voltage. The Tidd project of the American Electric Power Company, begun 13 years ago, proved that EHV transmission at 345 kv, 460 kv and above was practical and dependable. All operating conditions that could be expected were simulated. Today, transformers, power breakers, arresters and disconnect switches operate at extra-high voltages successfully on hundreds of miles of circuits.

Three years ago, a laboratory of rocks and snow, the Rockies, began yielding a wealth of data for design and operation under extremes of weather and high altitudes, furthering EHV studies. Sponsored by the Public Service Company of Colorado at Leadville, Colorado, this broad investigation of corona and radio influence, switching surges, conductor sizes, reduced insulation levels and economics of EHV is continuing.

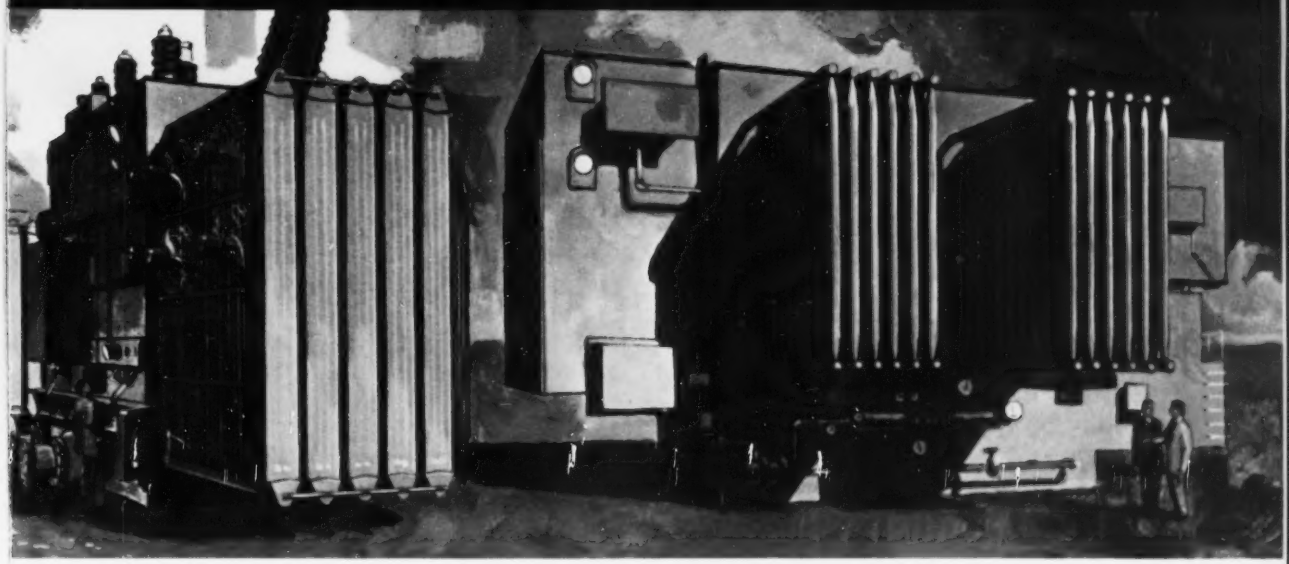
The Tidd and Leadville projects and other studies are the building blocks of EHV knowledge, making possible the design and application of the transmission equipment in your future.

Inner-Cooled transformers . . . reduced size and weight

Inner Cooling makes maximum use of oil as coolant and cellulose material as insulation, drastically reducing core and coil size. The significance of this design lies in two major areas. First, Inner Cooling now enables Westinghouse to build and ship transformers of

for your future system

Determination and resourcefulness to design the industry's most advanced line of apparatus . . . New Westinghouse products answer problems and objectives confronting the electric utility industry. At 200 research and design centers across Westinghouse, the industry's most concerted and interrelated effort to meet these objectives is continuing.



enormous capacity. The world's first transformer with Inner-Cooled construction was recently installed at New York State Electric & Gas Company, weighing only 3.1 pounds per kva. On higher voltage designs, weight has been brought down to 1 pound per kva.

Second, operating cost per kva is now lower than ever before. Performance has improved, permitting reduction of impedances and losses.

These compelling reasons commend the Inner-Cooled Westinghouse design for the transformer of the future.

Vapor-cooled transformers . . . combine dry-type safety with liquid-filled capacity and insulation level

Vapor-cooled, vapor gas-insulated transformers are another major breakthrough in Westinghouse power transformer design. This technique uses fluorocarbons to transfer heat . . . as a vaporizable liquid for cooling and as a high-dielectric gas to insure proper insulation strength. Two such transformers—the world's first, at Baltimore Gas & Electric Company and Consolidated Edison Company—are now in service and promise to be the ultimate answer in congested areas. They're nontoxic, nonexplosive, fireproof, thermally stable; in brief—they are safer.

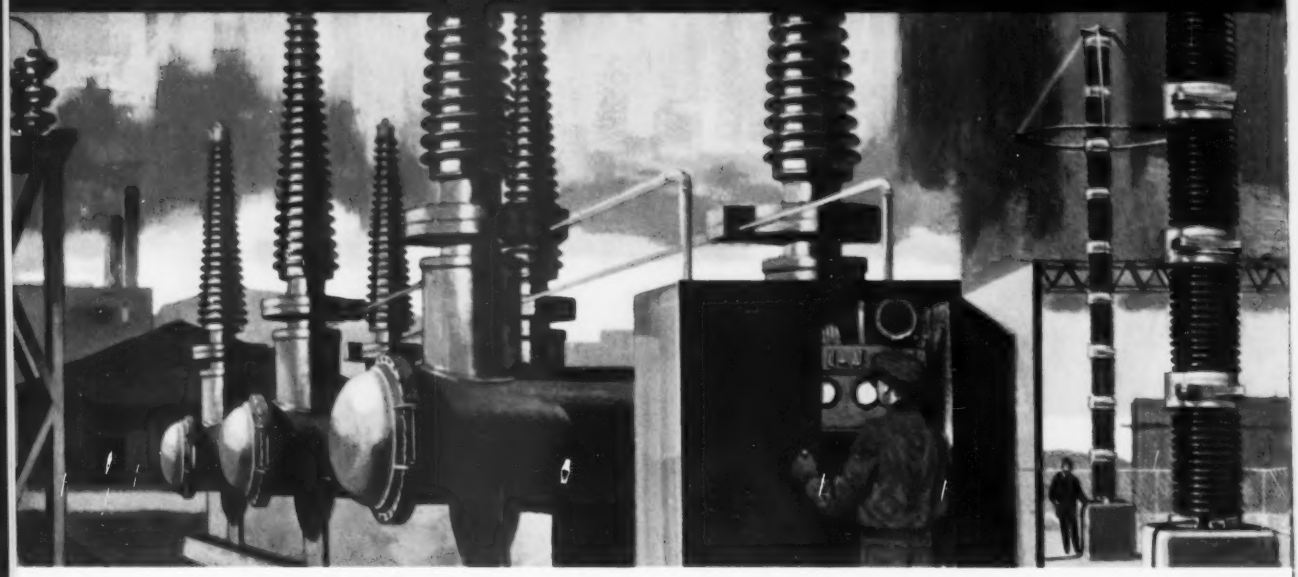
This transmission equipment can be built now, because for years Westinghouse has plowed earnings into research to insure the future of the electric utility industry.

YOU CAN BE SURE...IF IT'S **Westinghouse**

WESTINGHOUSE

is ready today to build products

to distribute power



Westinghouse is ready now to build 690-kv power breakers . . . SF_6 Gas is breakthrough to conquest of the industry's costliest arc extinguishing problems

Sulfur Hexafluoride—SF_6 Gas—is the interrupting medium for a 230-kv, 15 million-kva power circuit breaker now being built for Pennsylvania Power and Light Company. What are the limits to capacity of the SF_6 breaker principles? There are none.

Capacity is only one measure of the most significant breaker design advance in over 15 years. Safety? SF_6 is inert, nontoxic, odorless, nonflammable; breaker is dead tank construction. Maintenance? Drastically cut; arcs are extinguished without gas deterioration. Weight? Reduced up to 65 percent over comparable oil breaker ratings; foundations can be simplified. Quiet? Comparable to oil breakers; ideally suited for those substations in high load density residential areas.

Here is one more example of how Westinghouse has spent millions in product designs to save utilities tens of millions in future construction and operation.

Westinghouse is ready now to build lightning arresters at and above 690 kv

The idea of a nationwide transmission grid highlights two needs immediately . . . extra-high voltage transmission and standards of reliability never before achieved. EHV will be required to move large blocks of power economically. But, a basic problem in EHV reliability has been lightning outage. Application of a completely new theory of lightning stroke now promises to reduce lightning flashover by three to one. Effects of lightning on different designs of transmission

for your future system

Capability to produce the industry's most complete line of reliable apparatus . . . With utility industry progress at a dead run, a responsible manufacturer can do nothing less than provide equipment as operationally perfect as manufacturing science can produce. Westinghouse ability to continue to meet this challenge is evidenced by facilities being built and modernized throughout the company at the rate of 70 million dollars a year.

line can now be predicted with far greater accuracy. Increased line reliability must be matched by improved protection of equipment. Westinghouse is ready now to build arresters to meet the obligation of reliable, economical transmission . . . to 690 kv.

You can reduce distribution investment 25% by doubling secondary voltages

Apparatus investment in distribution systems is well over a billion dollars annually. An opportunity to save hundreds of millions of such an amount can scarcely be overlooked.

For example, in a high-use residential area, a 37½-kva transformer may serve four homes. In new housing developments, by changing over to 240-480-volt service, one transformer can do the work of four or five. With higher secondary voltages, primary voltages may be raised to 25 kv or even higher. This eliminates present intermediate voltage levels and need for substation transformation.

Average industry installation costs and capitalization rates indicate higher secondary voltage systems will save substantially through the years over present conventional systems.

Westinghouse is ready now to build pole-type transformers at 333 kva for commercial loads.
This equipment of the future can be built now, because for years Westinghouse has plowed earnings into research to insure the future of the electric utility industry.

YOU CAN BE SURE...IF IT'S **Westinghouse**

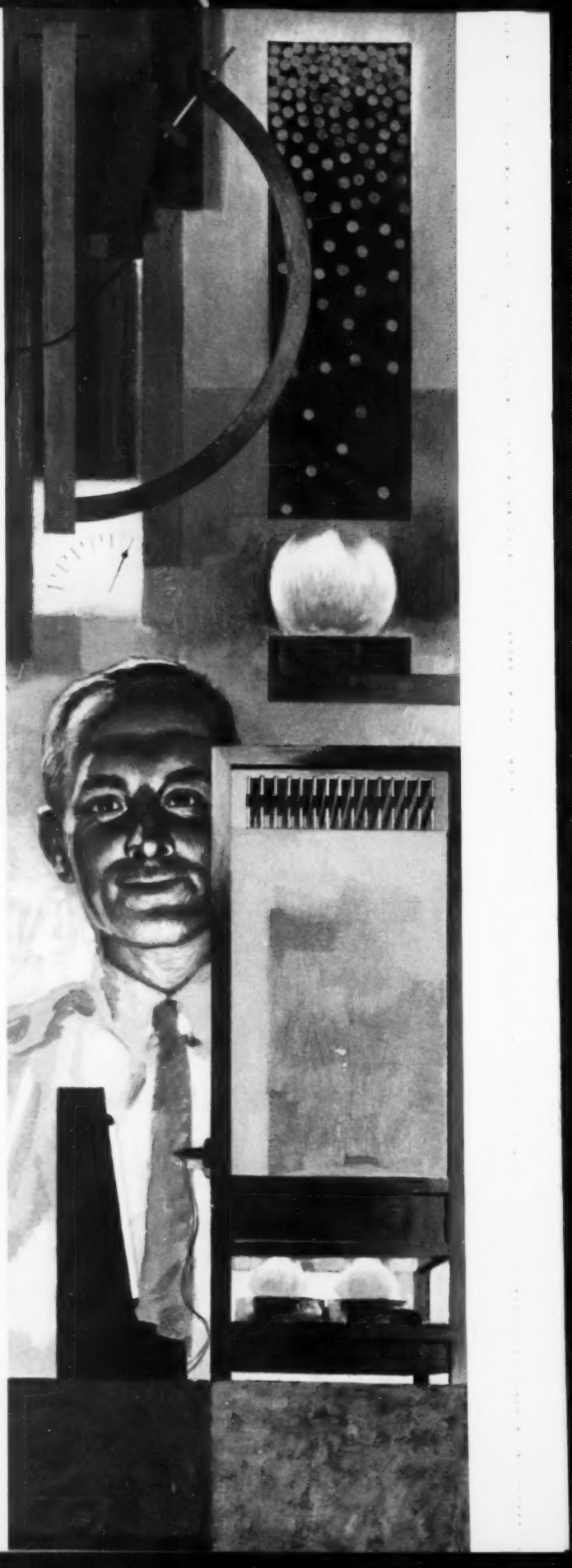
This experimental Westinghouse thermoelectric generator produces electric power by the direct conversion of heat into electricity. Work is progressing on this and similar advances—keys to the future beyond the developments discussed on the preceding pages.

there's time to plan but none to waste

The products shown on the preceding pages will be component parts of the power system of the 1960's . . . your system. The need for these products, so evident today, was discernible many years ago. Westinghouse marshaled foresight, talent and capital to develop them. Westinghouse presents them to you with the conviction that their place on your system should be recognized now, be planned for today.

Get in touch today with your Westinghouse representative. He can bring to bear on your system development program the talent and facilities of all of Westinghouse. CP-1051

YOU CAN BE SURE...IF IT'S Westinghouse



With field man Floyd Shipp and Earl Coyne, Montana manager, on either side A. L. Rowe makes vice-presidential report to District 9

NECA Seeks More of the Work

With a constructive and well diversified program and surprisingly large attendance of some 200, the annual Spring Conference of Districts 6, 8 and 9 of National Electrical Contractors Assn. at Glacier Park Lodge, Mont., strove to "build a better electrical West with NECA" —its slogan — June 22-24. Like the clouds that overshadowed the nearby peaks, there were four clouds of concern to shadow the otherwise blue sky of contractor business opportunity. These related to the volume of electrical construction business, of which NECA and IBEW are not doing what they consider their share; the loss of maintenance work for which a new intercraft competitive fight for maintenance contracts may develop; exclusion of apprenticeship training from the federal educational program to train technicians; and the dangerous ground of bid depository operation.

First morning was devoted to separate district meetings of the three districts presided over by their vice-presidents and discussing district problems. At each, reports were given of the recent meeting of the NECA executive committee on national programs and policies. A review of labor negotiations results was given members in each. Reports on training courses and marketing programs and exchange of experience as to the working of the referral procedure now required under Taft-Hartley were given.

After hearing a full report on the California legislation from its appointed legislative advocate, Ernest Kramm, District 9 officially moved to change its name from the California-Nevada Conference of NECA Chapters to 9th District Council of NECA. Its area coverage is California, Nevada and Hawaii and the new officers elected were J. D. O'Connor, regional vice-president, as its chairman; Emil Weber, San Francisco, vice-chairman; and Joe Krivanek, Sacramento, secretary-treasurer. It was set up as a non-profit corporation to conform with NECA constitution and bylaws.

From San Diego came first word of one of the new maintenance contracts issued by AFL-CIO over the heads of all of the craft unions without notice even to the IBEW.

All three districts voted for a continuation of the tri-district annual meeting and Puget Sound Chapter's invitation to hold the next in Seattle was accepted. The dates will be April 13-15, 1960.

The first session, presided over by A. L. Rowe, vice-president, District 8, Great Falls, dealt with national affairs of far more importance to local contracting than generally realized.

W. J. Cour, director of labor relations, NECA, Washington, D. C., besides reviewing the major services rendered by NECA for its members, summarized the amount of construction work in the nation as against who was doing it. In 1958 he said the aggregate pay roll was $25 million less than in 1957 in electrical construction by NECA and IBEW due to a large-scale do-it-yourself and nonunion movement.

He urged chapters to study their local markets and to find out who is doing the work as a means of taking steps to win more of this market back to union contractors. That association work must always be in the public interest he warned, "Let's never forget whenever the public deems that our work is not in the public interest you will be seeing

District 9 hears legislative results from Ernest Kramm; J. D. O'Connor, presides

Uncle Sam." Cour also mentioned the new setup of field service with the appointment of Charles Scholibo as a regional director for Districts 6, 8 and 9.

Kinsey Robinson, president, Washington Water Power, on a subject for which he has always been a champion, private enterprise, reminded them that all are part of the system and come to grips every day with its advantages and disadvantages. He contrasted living in a Soviet society as a warning of how close to it the nation is coming. He urged individual action, feeble as it might be, to protect the right to do business freely.

"Efforts to protect our liberties, like parenthood, are an individual problem. No one can do the job of talking to your employees, or to the PTA or to a labor union or a congressman for us. You have a viewpoint all your own and a unique way of expressing your views. Only you can extend the personable influence which you as an individual can exert," he declared.

Timely legal advice on bid depositories came from Ed Pewitt, for some years with the Antitrust Division and now part of the legal staff of NECA. He reminded that the Sherman antitrust law is here to stay and that fines lately have been up to $50,000 on each count; that even if found innocent, legal cases are troublesome and highly expensive; that they are criminal cases and judgment against one leaves one liable to treble damages from civil actions of people who have been hurt; and that in 80% of all antitrust cases the government has won. These warnings were preliminary to some dos and don'ts about the operation of bid depositories. Even the so-called St. Paul "railroad clearance" of a bid depository form of operation and the ruling in the Bakersfield case should not be taken as permission to make depositories do anything they should not do.

Proud of their joint apprenticeship training programs with IBEW, NECA is alarmed at the interpretation given to the National Defense Education Act of 1958 which provides for area vocational schools to train technicians in "skills essential to national defense," by short-term courses.

Apprenticeship as such, Douglas Ellis, assistant director of apprenticeship training, declared, may not be entitled to the benefits of Title 3 and the building trades seem to be spelled out as not essential to defense. Schools in 43 states have already filed plans for such programs and the trades themselves have not been consulted. Inadequate screening and training may result, it was feared. Ellis recommended as a defense to get an active apprenticeship program in motion and to demand assistance from the law. This means responsibility to provide technically trained people in a local program with local people, local unions and local industry.

The second day's meeting under W. R. Grasle, vice-president, District 6, Portland, dealt largely with labor relations. Cour returned to speak of labor relations on a national level. In it he spoke of the formation of a construction industry joint conference to find out why the volume of contract construction is decreasing and to review the entire union and contractor relationship. Eighteen unions and 16 associations in the building trades belong to the conference and are trying to find out what has happened. He spoke of finding fancy fringes in many contracts but no work and that re-examination of these "gold-plated conditions" was necessary to see what was needed to regain some of the maintenance and residential wiring and construction that has gone non-union or to UAW or District 50.

Jim Murphy, management analyst, and Charles Hart, research engineer, NECA

Among methods being discussed was a form of agreement for maintenance work by which a contractor of any type could offer to do all the maintenance work of a plant or industry at construction rates. The building trades would furnish men of all classifications and trades to do the work. This would mean, however, that electrical contractors would have to compete with contractors of other classes to get such contracts, a thing that already had happened in the San Diego case.

Charles Scholibo, new director of the Western Region office, NECA, in San Francisco, speaking on labor relations at the local level, urged year-round meetings with the union to iron out difficulties and not wait until negotiation time for a pile-up of many small and large problems. He declared that no problem with an individual should be settled directly with him but taken up through the business manager of the chapter and in the early stages of the dispute. He further urged that

W. J. Cour, labor relations, NECA, and Ed Pewitt, attorney, with host District 8 Vice-president A. L. Rowe of Montana

Kinsey Robinson and line contractors Roy Johnson of Power City, Spokane, and Matt Wilson, Portland, relished a line yarn

H. A. Hagen, field representative, Howard Bayley and V-p Wes Grasle, Dist. 6

contract agreements be kept as simple as possible to avoid confusion and misinterpretation.

The session ended with an excellent talk on public relations by Colin Raff, vice-president, Montana Power Co. After describing some of the fundamentals of a good public relations program he declared that the best public relations representatives the contractor has are his employees. Discourteous employees can wreck the business whereas courteous ones can influence more people in walks of life that the contractor himself does not move in. He urged that they be kept informed before they tell the public and never be left in the position of not knowing what to answer when asked.

The Wednesday morning session was divided, the Line Constructors meeting under Homer Puariea of Tacoma, chairman; the Inside Constructors under W. R. Grasle. Walter Kanzler, Bonneville Power Administration, presented a paper illustrated by graphs and charts on "Planning the Work" which will be published here later.

A session on foreman and supervisor training was held, over which Eugene Ridenour, Northwest Line Constructors apprenticeship and training director, acted as moderator. He later talked on actual operation of apprenticeship training programs under the title "Talking Won't Do the Job." Apprenticeship committees, how they should be organized and their activities in various phases of the program were brought out.

A. R. Woolley, Intermountain Chapter, NECA, Salt Lake City, presented a clarifying address on just what is meant by the new referral procedure and how it must be operated.

The Inside Constructors session was pretty much of a workshop on the various programs of the association. L. M. Stewart, Spokane, followed a presentation of a cartoon-illustrated talk on job management courses for the training of personnel doing management functions as well as for the contractor-owner himself. This was given by Charles Hart of the research staff of NECA, Washington, D. C.

Stewart discussed personal experiences in the field regarding specifications, government inspectors, purchase orders. He discussed the "or equal" difficulties in regard to special fixtures and urged knowing which wholesalers handle what lines and types of material to prevent delays in shipment.

Tools and equipment was the subject covered by Karl Stolting of Santa Rosa. He said that the job management course had alerted him to the importance of tools. In it he discussed the formula for the ratio of tool inventory to volume and a need for reimbursement for tool and equipment costs, depreciation on tools and guarding against theft. He spoke of a tool pool being set up by a group of contractors for rental to each other in Santa Rosa.

In a strong talk on the importance of personnel management, Ralph E. Johnson of Denver made a clear analysis of the responsibilities of the management personnel and ended with a strong plea that contractors face up to their responsibility and need for the training of more men. (This address may be published here later.) The importance of giving workers the privilege of thinking on their work was particularly significant.

An interesting point he made was that nearly all forms of incentive are denied contractors in their bargaining relationship with the union and that what loyalty there is mostly accrues to the union itself and not the employer or the public. "If an attempt had been made deliberately to create the most undesirable conditions nothing better could have been devised," he said. Steps to overcome this handicap are absolutely necessary if good personal and public relations are to be maintained, he pointed out.

Methods of labor cost analysis and the purpose of it were described by Col. Charles P. Bobe of St. Louis. There is no lack of labor cost information, he said, and the association has to tap the records of jobs done. It was also announced that Matt Sherwood, technical editor of *Qualified Contractor*, has been assigned the responsibility of contacting many contractors individually to hurry along the revision of NECA's labor data.

For the afternoon session J. D. O'Connor, vice-president, District 9, presided and F. E. Keith of Des Moines, Iowa, chairman of NECA's marketing committee, reviewed the marketing program set up by the association. Besides the series of ads in national magazines and a news letter for line constructors, a film is being put together from line constructors private sources to be used to show the capabilities of line constructors to do utility work. He also described the market research five-step program, the last step of which is due to be released Sept. 21 and be shown to district council meetings between then and the November national convention.

In a refreshing and sparkling talk that brought personal consideration for the ultimate consumer, the public, in as a prime requisite to successful contracting, Norman Ferguson, California Electric Works, San Diego, described his own company's advertising and promotional methods. How that company makes every person of its 216 staff profit-conscious and a public relations contact man or woman, a salesman for all of the complete lines of services of the company was described. Every employee is shown it is his duty to make a profit, a duty to himself, to his family, to his fellow employees, to the public and to the nation.

"We are convinced that success only comes through a reputation for service and good work. The growth of the company must parallel the growth of the community. The community has a right to expect new services, new products and the size of organization skilled and equipped to adapt itself to the needs of its customers.

"All too few electrical contractors fight to protect their customers."

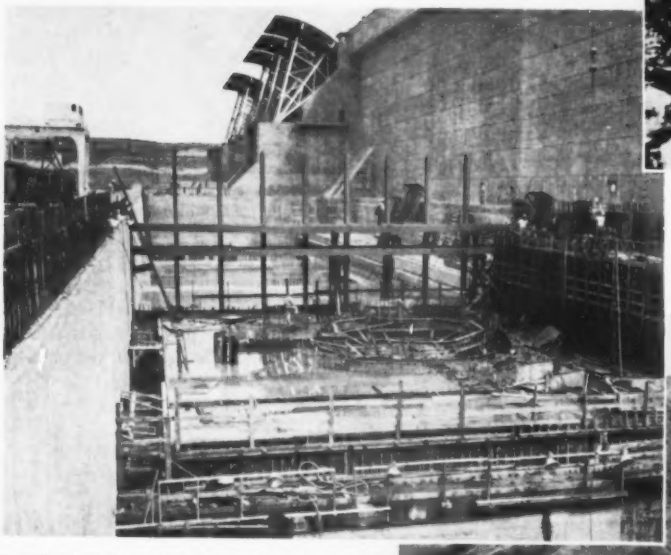
Final program feature was the commercial building modernization program of Westinghouse as presented by W. L. Trudgian of San Francisco. The program is aimed at converting unprofitable buildings into profitable ones by pumping new life into them. This program is being shared with contractors by Westinghouse and utilities.

General convention chairman was Galen Naylor, and convention secretary Earl Coyne, manager of the Montana Chapter, as well as every member of the chapter were hosts and committeemen handling arrangements to make it a social as well as a business success.

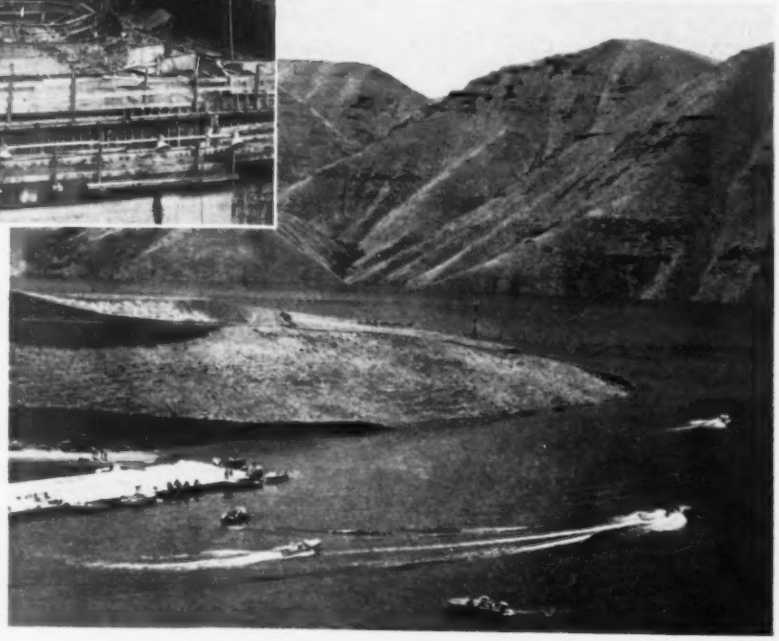
news

Thomas W. Delzell, chairman of the board and chief executive officer of Portland General Electric Co., left, speaks at dedication of the North Fork project. Above is the community kitchen at Promontory Park, a 16-acre recreation area bordering the new reservoir, just 35 miles from Portland. The park was dedicated at the same time. Ceremonies included a water show put on by the nearby Estacada community

As gates were closed in the sluiceway of the Upper Baker River Dam of Puget Sound Power & Light Co. July 10 the reservoir began to fill and more Northwest hydroelectric expansion became a reality. The dam is part of a $54 million development of the Baker



Scroll cases for the first three generating units are being set and foundations being poured at Ice Harbor Dam, the Corps of Engineers project located on the Snake River just upstream from Pasco, Wash. Gates over the spillway bays are shown in the background. The dam is first of four projects planned for the lower Snake River



Haven for boaters is the wide, sheltered harbor being developed by Idaho Power Co. on mountain-rimmed Brownlee Lake, two miles above its new hydroelectric project. Part of the harbor is shown on a recent Sunday when nearly 70 craft used its facilities. Dock is 150 ft long

EW

Management

G-E Gets Order

A $14 million order for 10 87,500-kva hydro generators was received today by the General Electric Co.'s Large Motor and Generator Department for the Wanapum project of Public Utility District No. 2 of Grant County, Wash.

Delivery of the 10 units is scheduled to begin the latter part of 1960 with one unit to be delivered every two months. Each of these units will be 40 ft in diameter and weigh 1,900,000 lb.

In announcing receipt of the order, Maynard W. Johnson, department general manager, said: "This award indicates confidence in General Electric standards of engineering design and manufacturing skill." He added, "Superior performance in all department functions is paramount if we are to remain effectively competitive with foreign manufacturers of large capital goods equipment."

The other bid considered was made by ASEA of Sweden and totaled $10,500,000.

The Wanapum project, at Ephrata, Wash., is the second of two for Grant County, the other being the Priest Rapids project.

Bechtel to Build Plant

Bechtel Corp. of San Francisco has been awarded a prime contract by Consumers Power Co. of Jackson, Mich., to engineer and construct a 50,000-kw nuclear power station on Lake Michigan. General Electric will supply the nuclear portion of the plant and the turbine-generating equipment.

The plant will cost $30 million and is scheduled for operation in 1962, Dan E. Karn, Consumer Power Co. president, announced.

The reactor will be a direct cycle, forced circulation, boiling water type and will have as its primary objective the development of engineering and economic data on high power density and high specific power. It will be furnished by General Electric's Atomic Power Equipment Department at San Jose.

Karn said that his company will undertake an extensive research and development program on reactor core and fuel design in conjunction with General Electric. Goal of this program will be to increase the power density to permit an eventual reactor power rating of 75,000 kw.

Walkout at Glen Canyon

Prospects are dim for an early settlement of a strike of building trades workers on the huge Glen Canyon Dam being built by Merritt-Chapman-Scott. The major issue is that of subsistence compensation for a remote area.

Recently the Arizona building trades union declassified Page, Ariz., as a remote site. On the other hand, deliberations are complicated by the action of the building trades union and Associated General Contractors of Arizona, which provides for a payment of up to $6 a day for work outside 12 designated Arizona cities. Page was not one of those cities.

Five-Year Fight Ends

The water war between the North and the South (of California) apparently ended with the passage of a water development program bill that will eventually cost the people $14 billion. This will bring the construction of the Feather River Project and the huge aqueduct system to southern California one step closer to reality. Next hurdle is passage of a $1.75 billion bond issue to be presented to the people in November 1960.

Work, however, is already under way on the vast project under an $83 million appropriation made possible out of funds collected from tideland oil royalties.

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BPA to Study Intertie

Bonneville Power Administration will make the study of feasibility and desirability of a high-voltage interconnection between the Pacific Northwest and California directed by a resolution of the Senate Committee on Interior and Insular Affairs in consultation with a 12-man committee representing all facets of power interest in the areas.

This was decided at a meeting of some 60 utility and governmental representatives called by Dr. William A. Pearl, Bonneville administrator, on June 24 to work out ways and means of carrying out the senate committee's directive for consultation. The group indicated Dec. 31 as the earliest possible date for the comprehensive study and estimates asked by the committee.

The consultation committee will consist of representatives of the governors of California, Oregon and Washington, plus Idaho and Montana, the FPC, Public Utility Districts of the Northwest, REA Co-ops, California public agencies, California private utilities, the Northwest Power Pool and the Pacific Northwest Utilities Conference Committee (both public and private agencies of the Northwest are represented on the latter two).

The larger consultative group indicated the study should be made to cover a 25-year period of operation of the proposed intertie, unless it becomes apparent that the Northwest will not have surplus secondary power to export for that long a period.

Complicated Colorado Water Deal

That power and water go hand in hand in Western developments is illustrated by a contract between the Denver Water Board and the Public Service Co. of Colorado. Here are the steps.

The Denver Water Board built a dam and power plant on Williams Fork to trap high flows during the spring runoff for water supply. The power plant has a prime function of providing electrical energy replacement for power that otherwise could have been generated at the

federal government's Green Mountain power station. This replacement requirement was decreed by the U. S. District Court decision in October 1955.

Public Service has agreed to purchase all of the energy in excess of that needed to satisfy the replacement needs of the federal governmetn at a $1-per-kilowatt demand ($3,000 per month) with additional energy charges of 4½ mills per kilowatt-hour up to the 250-kwh level and 4 mills per kwh above that level. Energy from spilled water would be sold to Public Service for 2 mills per kwh.

Mountain Sheep Change

A new height (1,510 ft) for the proposed High Mountain Sheep Dam on the Snake River has been included in final recommendations for water resource development in the Columbia River Basin by the Army Engineers' Board for Rivers and Harbors, raising the dam's cost from $226 million to almost $242 million.

This would be 20 ft higher than the board's original proposal for the dam (1,490 ft), and it would increase High Mountain Sheep's installed power capacity from 600,000 kw to about 620,000 kw.

Admittedly, the higher pool would cut into the power head at the upstream Hells Canyon Dam site of Idaho Power Co. during certain periods of the year. The board's original plan for a 1,490-ft pool at High Mountain Sheep would have backed water up precisely to the Hells Canyon tailwater.

Utility Valuations Up

Operating properties of the Puget Sound Power & Light Co. have increased in value $29,600,000 in the past year to $126,100,000, in the opinion of the Washington Tax Commission.

Pacific Power & Light Co. properties increased in value in about the same amount to $97,115,000, the commission ruled, in tentative valuations now subject to appeal. Properties of the Washington Water Power Co. were valued at $59,500,000, an increase of $2½ million.

The California State Board of Equalization has assessed the value of Southern California Edison Co. property at $527,185,000, an increase of $46,413,950 over 1959.

In terms of tax dollars, this means the Edison tax bill will be upped a total of nearly $2,900,000 in the counties where it operates.

Bond Rate Rises

The Los Angeles Department of Water & Power has had to pay the highest rate in 25 years on the sale of $15 million worth of revenue bonds to finance part of the 1959 construction program. The interest cost was 4.1169%.

Back in 1934, a $2 million issue was sold at 4.25% but since that time the city has enjoyed substantially lower money costs.

The 1959-60 fiscal budget, which was adopted June 30 by the Board of Water & Power commissioners, totaled $208,893,000. While construction costs budgeted for the new year are $16 million less, other costs, including fuel for power generation, have gone up so that the new budget will be $4.6 billion below that of the past fiscal year.

Included in the construction budget is the completion of a second generating unit at Scattergood steam plant, $4 million for preliminary work on the Haynes steam plant and $1,400,000 for three new service facilities in the San Fernando Valley.

Tacoma Seeks Increase

Tacoma City Light was instructed by the Tacoma Utilities Board to draw up a residential rate schedule that would produce an average increase of about 7%. Some members of the board favored an increase as high as 10% but the lower figure finally was adopted. The new rates are expected to go into effect in the fall.

At the same meeting, the utilities board agreed that it would ask the FPC in 1961 for the right to delay completion of proposed Mossyrock Dam on the Cowlitz River. The FPC previously has indicated it wants the project to be completed by 1963 but now has agreed to the 1965 date.

Engineers Dismissed

Lack of projects has caused a major reduction in engineering and planning staffs of the government-owned B. C. Power Commission. Twelve engineers have received notice that their services are no longer required and the number of layoffs is expected to reach about 50 by the end of the year.

BCPC spokesmen said there was no general economy move. They explained the completion of such multimillion-dollar projects as the Strathcona development, Georgia generating station and the Ash River scheme means the men are no longer needed.

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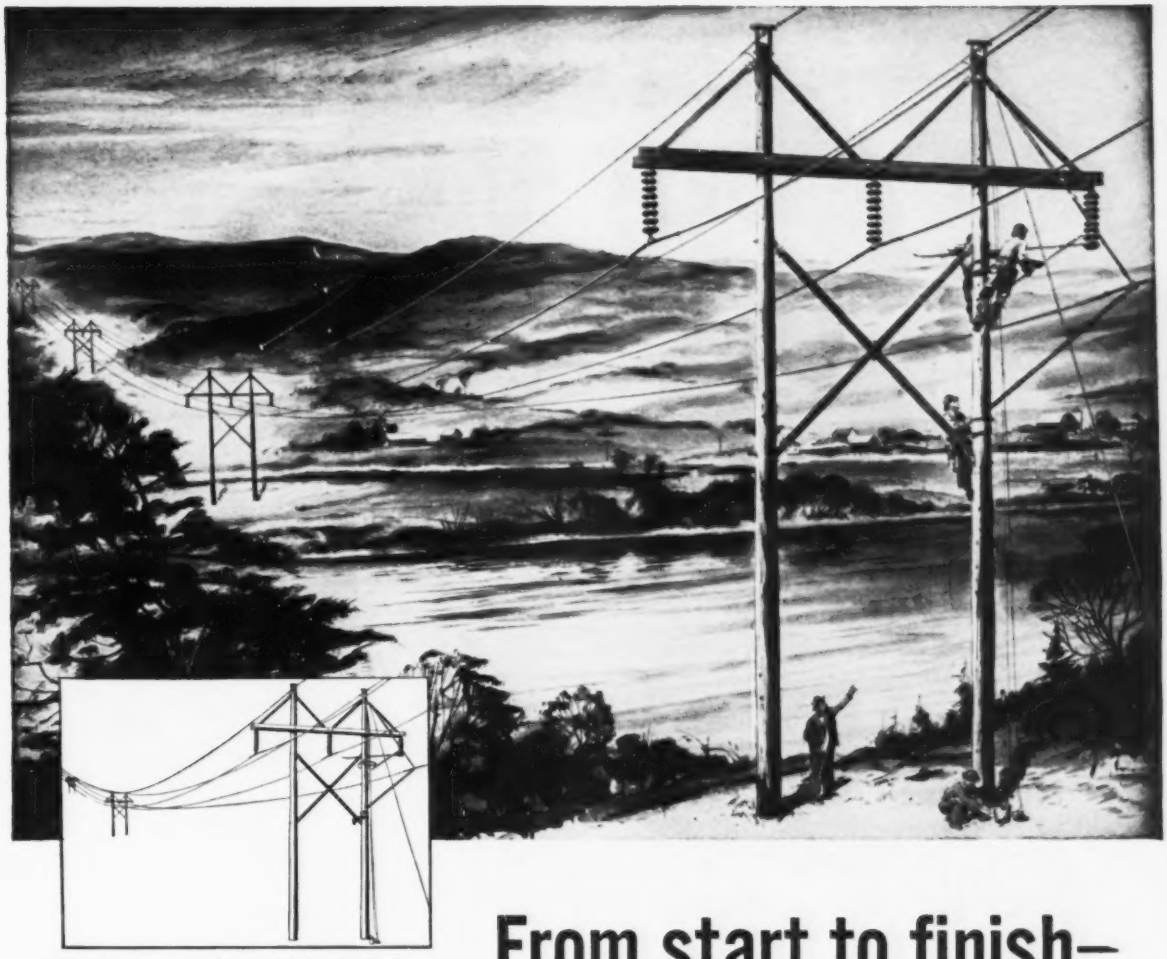

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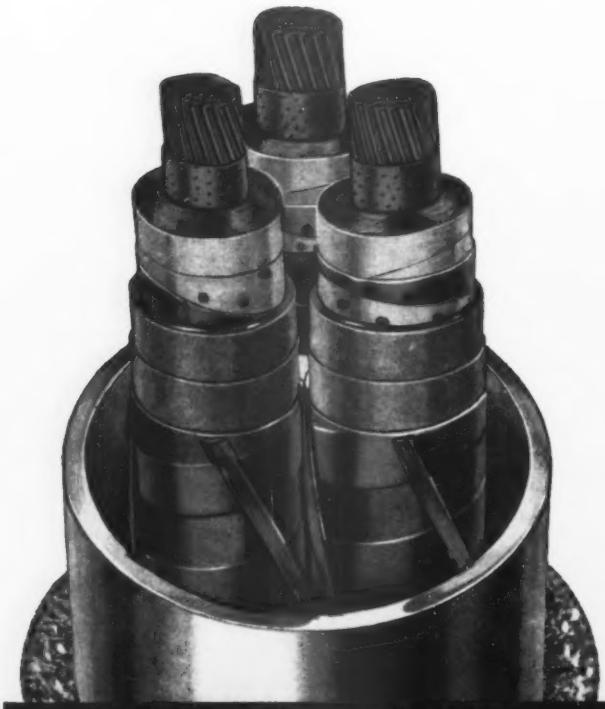

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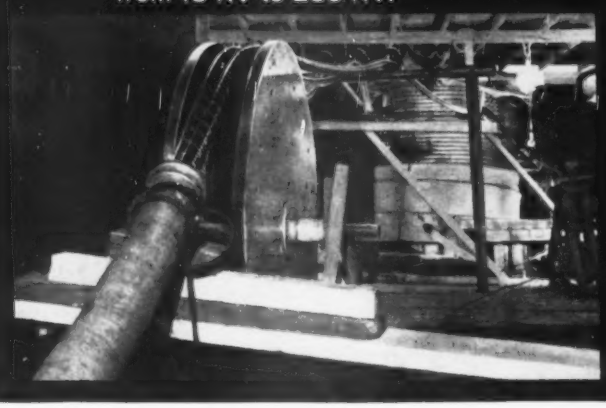

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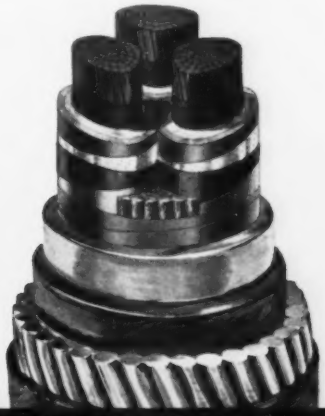

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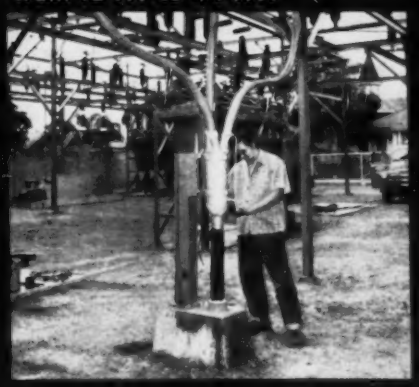

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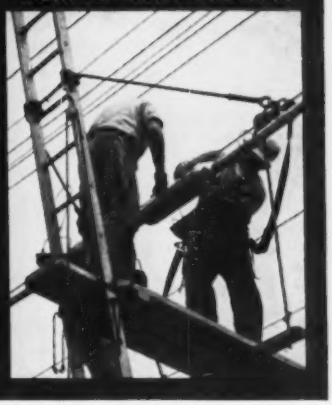

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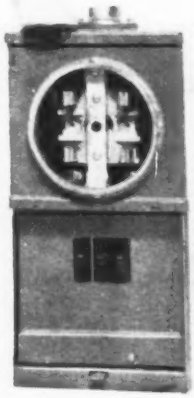

* Our priceless model is Jill Floyd, granddaughter of Al Johnson, president of Alwalt Manufacturing Company and Circle A-W Products Company.

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Domestic Unit Competes

Florida Power & Light Co. has purchased a 300,000-kw steam turbine-generator unit from General Electric Co.'s Large Steam Turbine-Generator Department.

According to the Florida utility, bids had been submitted by both domestic and foreign manufacturers for a smaller 240,000-kw unit, but a reappraisal of the future electric power load requirements indicated a larger unit was needed.

The unit sold by General Electric is scheduled for delivery in the spring of 1962 and "is larger than any that the foreign concerns could deliver" by that date, according to Florida Power & Light Co.

G & T Co-op Gets Permit

FPC has issued a 24-month preliminary permit to the Lewis-Clark G and T Cooperative Inc. of Walla Walla, Wash., for a proposed hydroelectric project on the Yaak River in Lincoln County, Mont. The proposed project would consist of a concrete gravity dam, about 250 ft high and 1,500 ft long, located about 30 miles upstream from the confluence of the Yaak and Kootenai Rivers. The dam would create a storage reservoir extending 15 miles upstream and would have a total storage capacity of 726,000 acre-ft, of which 397,700 acre-ft would be usable power storage. A 25,000-kw generating plant would be located immediately below the dam.

Lewis-Clark is an association of 10 REA-financed cooperatives. Power generated by the project would be used to supply the long-range power requirements of the association members.

New WWP Department

Washington Water Power Co. has created a systems and procedures department to be headed up by J. E. Winton. It will be a staff organization to advise and assist departments and divisions throughout the company. Its functions and responsibilities are to provide general administrative assistance, analysis of general operations, clerical and accounting procedures and to promote standardization and unified company policies and procedures.

WWP management believes that many functions have required closer executive attention and this new department provides a central staff organization to serve divisions and departments alike.

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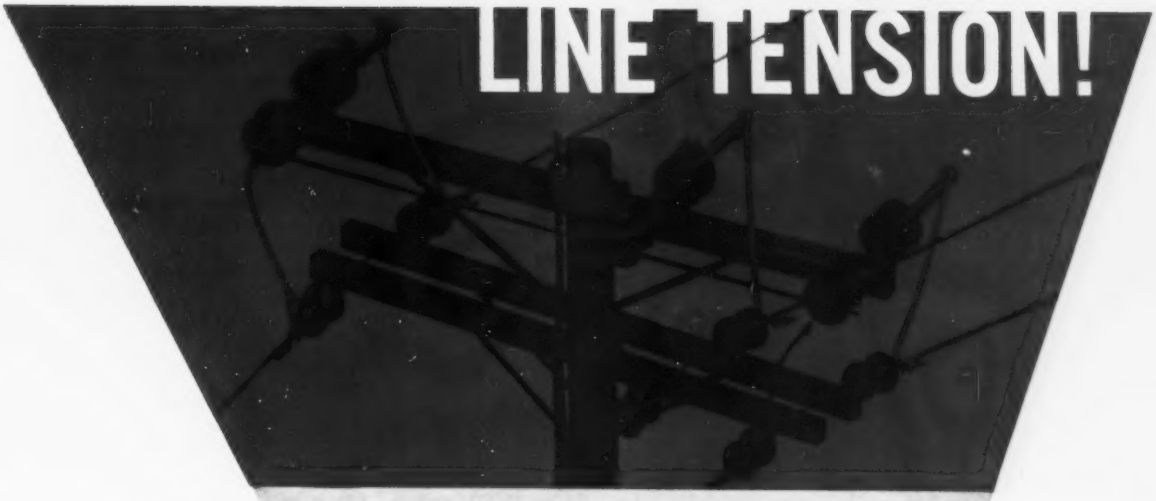

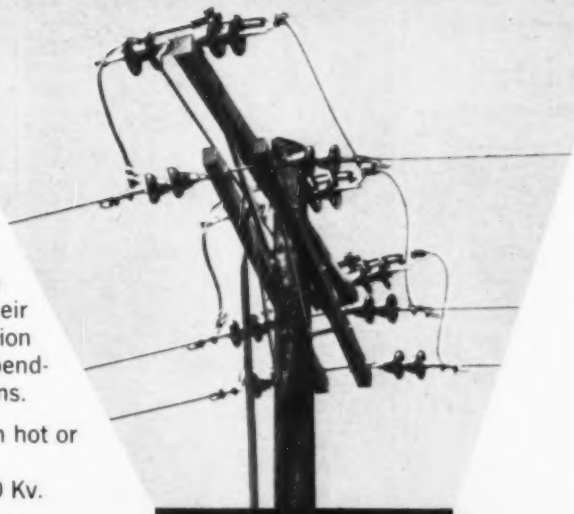

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People

Skinner

Cayot

► **R. A. Cayot,** manager of the Drum Division of Pacific Gas and Electric Co., retired June 30 with 41 years' service. He will be succeeded by **Walter D. Skinner,** formerly district manager at Sacramento.

► **James A. Guthrie,** editor and president of the San Bernardino Daily Sun-Telegram, and **E. S. Kassler Jr.,** Denver business and civic leader, have been elected members of the board of directors of California Electric Power Co.

► **Harold A. Noble,** vice-president of operations for San Diego Gas & Electric Co., has been elected a director of the company to succeed **Morton B. Fowler** who resigned. Noble has been in San Diego G&E's service for 34 years. Fowler had retired as a vice-president in 1945. He had been a member of the board of directors since 1907.

Noble

► **Walt Woirol** has been named to the newly created position of treasurer of the Chelan County PUD at Wenatchee, Wash.

► **W. A. Mueller** has been appointed manager, appliance sales, for Graybar Electric Co. in Denver.

► **Davis M. DeBard,** for many years associated with Stone & Webster Service Corp., has accepted a position as a consultant with Ashton B. Collins, president of Reddy Kilowatt Inc.

► **William W. Talbott,** manager of the Montana Power Co. Bozeman-Livingston District, has been appointed executive assistant. He will be succeeded as division manager by **John W. Cromer.**

Harper

Ferguson

► **Robert C. Harper** has been named West Coast regional vice-president of Sylvania Electric Products Inc. Promoted to the position of vice-president and general manager of the company's Mountain View, Calif., operations is **Samuel A. Ferguson.** Harper has been director of Pacific Coast sales since 1956 and the new appointment gives him responsibility for the direction of the company's marketing activities in 12 Western states and Hawaii.

► **William Thompson** has been promoted to chief inspector for the Fluor Corp. Ltd. He joined the engineering-construction firm in 1951 as an inspector. In 1953 he was appointed chief inspector. In his new post he reports directly to E. C. Austin, vice-president—procurement.

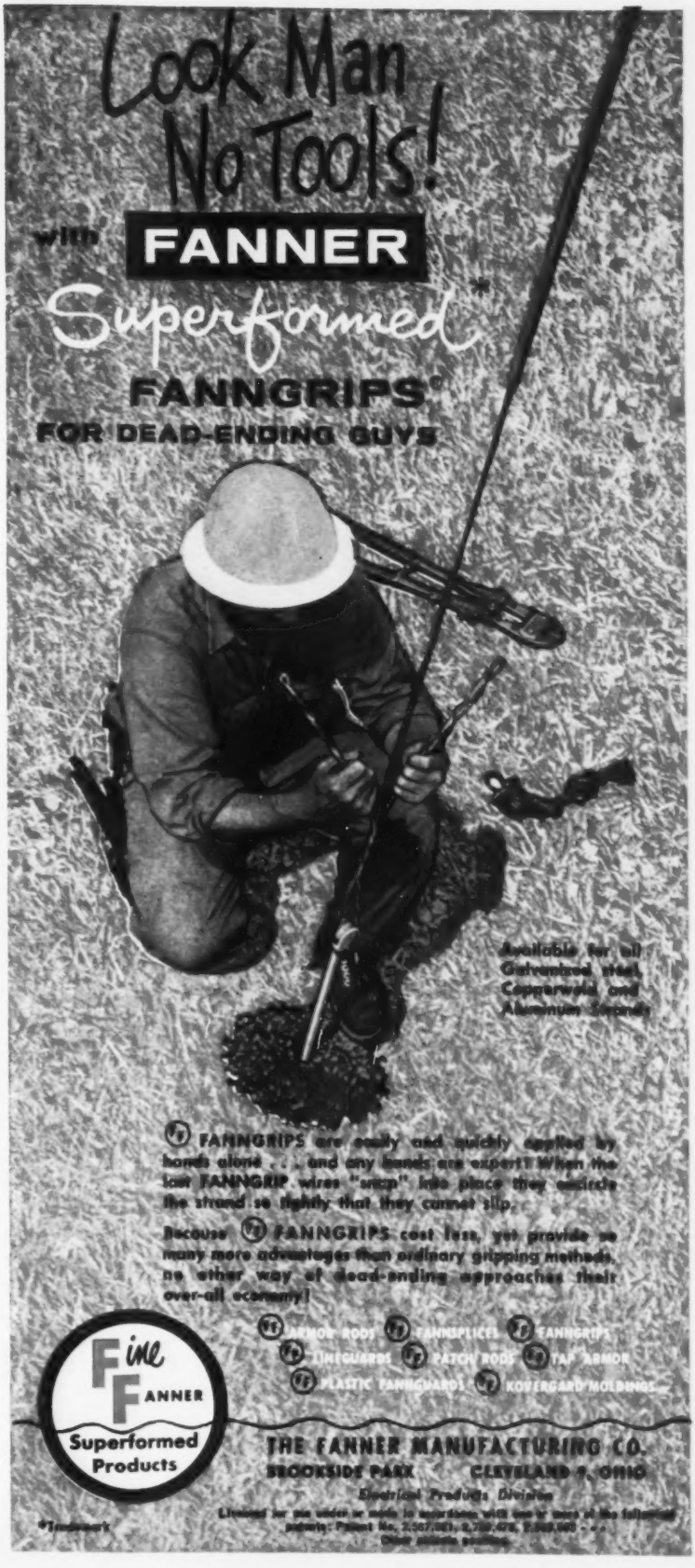
Thompson

► **Fred A. Duke,** a representative of Local 125, IBEW, Portland, has been awarded a certificate of appreciation by Secretary of the Army Wilbur M. Brucker for successful integration of a U. S. Corps of Engineers power wage schedule with other elements of the electric utility industry in the Pacific Northwest.

► **Myron Bostwick,** Portland General Electric Co. protection engineer, has been made a Fellow of the American Institute of Electrical Engineers. Bostwick's honor was conferred for "contribution to relay protection of electric power systems."

► **Abe Hoss,** manager of area development for Portland General Electric Co., has been elected a director of the Pacific Northwest Industrial Development Council.

► **Glenn Jackson,** vice-president of California Oregon Power Co., has been appointed to the Oregon State Highway Commission by Gov. Mark Hatfield.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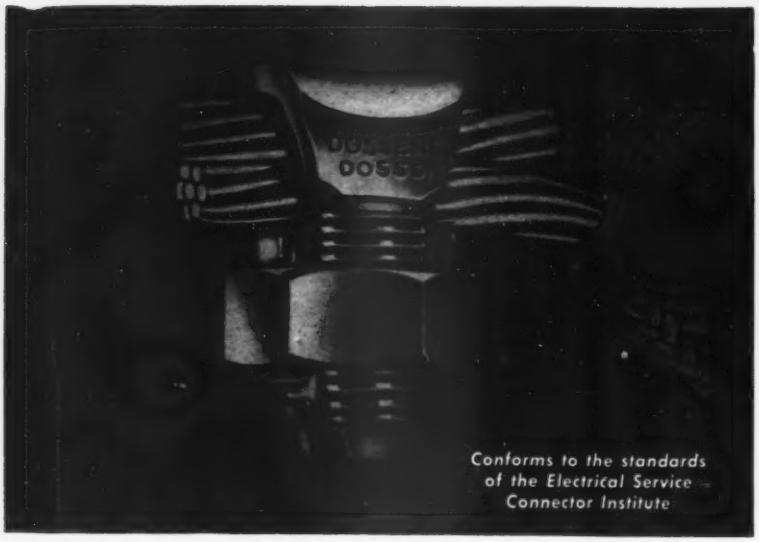

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Baugh

Bettersworth

► **Thomas A. Bettersworth** has been appointed chief electric distribution engineer of Pacific Gas and Electric Company to succeed **Clive E. Baugh.** Bettersworth was principal assistant to Baugh, who had 44 years of service with the company and 12 years as head of the electric distribution division.

► **Ray E. Adams** has joined the firm of Donald S. Gleason & Associates in the Pacific Northwest. The company represents Prescolite Mfg. Corp., John C. Virden Co., and Lighting Dynamics, subsidiary of John C. Virden Co. Adams was formally lighting and heating manager for North Coast Electric Co. in Seattle.

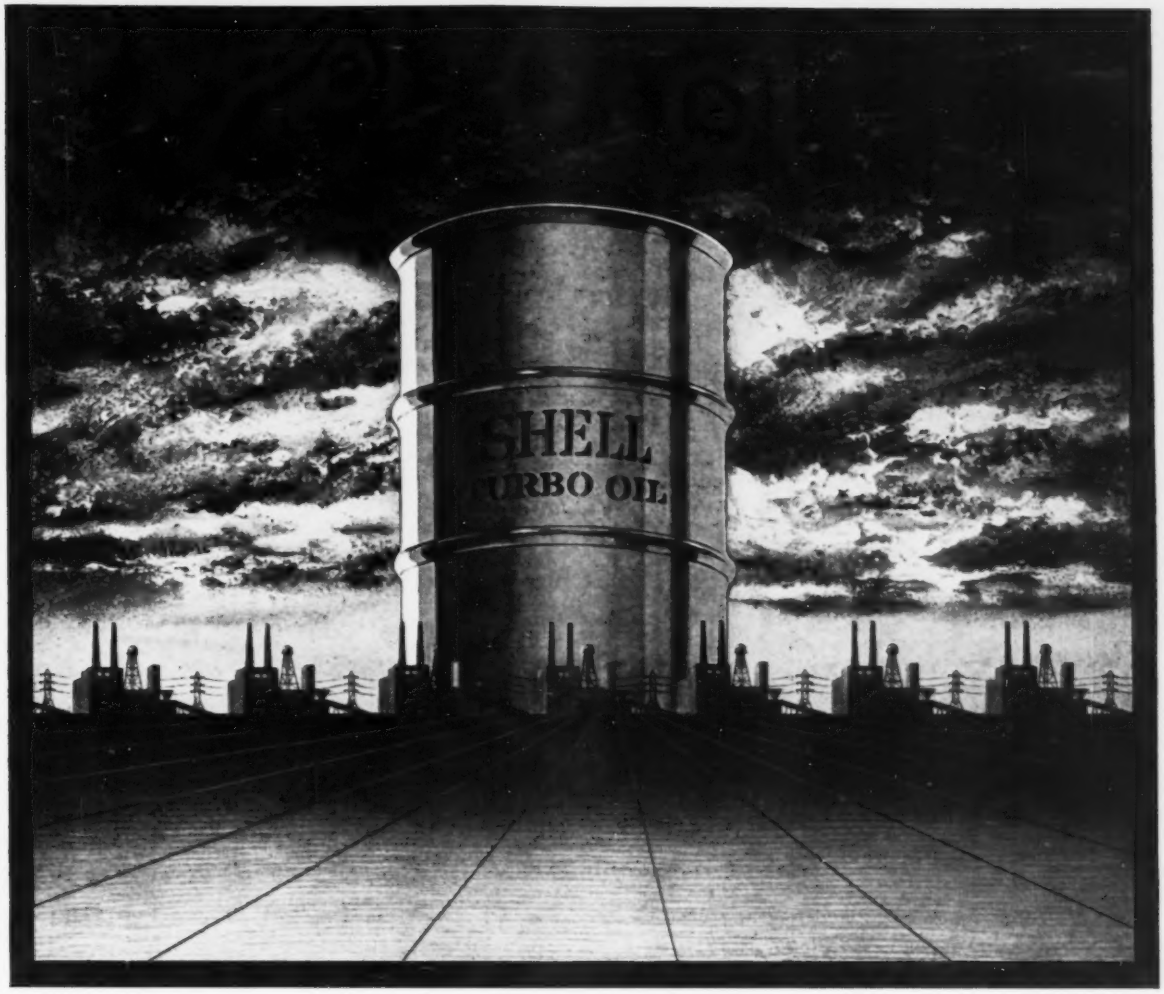
► **Jim Willrodt** has joined Line Materials Industries' field engineering staff in Los Angeles. He has been undergoing training in Milwaukee.

► **Robert H. Hirte** has been appointed general sales manager of the All-Brite lighting division, Curtis-AllBrite Lighting Inc., in South San Francisco. In his new capacity, he succeeds Charles D. Buchanan, now president of the company. Hirte was formerly district manager of the All-Brite branch in Los Angeles. Prior to his association with All-Brite he owned and operated the Tri-State Electric Co., a wholesale business he founded after service with the U. S. Armed Forces during World War II.

Hirte

► **A. A. Bradley** who recently retired as business manager and financial secretary of Local 76, IBEW, has been appointed a member of the Tacoma Utility Board.

► **Robert N. May** has been named sales manager of major appliances for the Los Angeles district of Westinghouse Appliance Sales. He comes to Los Angeles from Des Moines.



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INDIANA
STEEL & WIRE CO., INC., Muncie, Indiana

► **Robert H. Shaffer** has been named vice-president in charge of manufacturing for the combined Curtis-AllBrite Lighting Inc. operations. In his new capacity he will coordinate all manufacturing at the six Curtis-AllBrite plants in South San Francisco, Los Angeles, Seattle, Chicago, Toronto and Vancouver. He will headquarter at South San Francisco.

Shaffer

► **James F. Angle** has been appointed district manager of the newly created Salt Lake City district office of the Okonite Co. The office is in the Surety Life Building, 1935 South Main St. Angle is a graduate of Oregon State College, and previously served for three years as a sales engineer in the company's Los Angeles office.

► **Sam R. Howard** has been named district manager of the Los Angeles sales office of the Okonite Co. He is a graduate of the University of Southern California with a bachelor's degree in engineering and has been a sales engineer for the company in Los Angeles since 1956.

► **Chauncey J. Davis** retired July 1 from service with Utah Power & Light Co. after 32 years. He was in the electrical maintenance section, Salt Lake Division.

► Rex N. Anderson has been named Salt Lake City area sales manager for Westinghouse Electric Corp.

► **V. S. Casebolt,** new manager of Washington Water Power's personnel and industrial relations department, has been appointed assistant vice-president.

► **F. Willard Nelson** retired July 1 as Pomona district manager for Southern California Edison Co. He had been with the utility 37 years and Pomona manager since 1949. His successor will be **Glenn L. Taylor** who has been serving as assistant district manager in Covina.

► **Barney Alverson** has been promoted to assistant building official of San Bernardino County in an expansion of the department. He still handles the electrical division as well as the new administrative position.

► **E. E. MacGilvra,** an executive assistant to company officers of Montana Power Co., retired June 30. For many years he had represented the company in matters concerning claims, lands, right-of-way and similar affairs between the company and the public.

► **William B. Bonnett** has been promoted from southern division sales manager to assistant division manager of Puget Sound Power and Light Co. Succeeding him in his former post is Orland G. Hunt.

► **Jerry T. Gravkin** has joined Graybar Electric's San Francisco sales staff. He will handle the electric housewares department in the San Jose territory.

► **Calvin Friar** has been appointed assistant district manager in the northern California-northern Nevada district of Union Metal Mfg. Co. He will headquarter at 127 Montgomery St., San Francisco. Among the products he will sell are monotube lighting poles. He earned both Bachelor of Science and Master of Science degrees in civil engineering at the University of Maine. He also attended Alabama Polytechnic Institute.

Friar

► **Allyn W. Falls,** management consultant, is now associated with Ebasco Services Inc., in the San Francisco office.

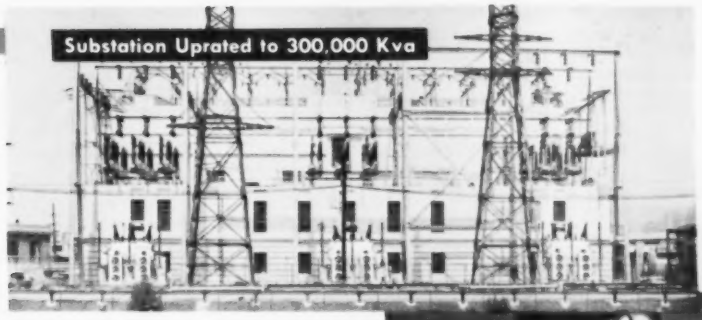
► **Garth A. Duell,** geologist, will head up geological investigations under a new department of research organized by Pacific Power and Light Co. He will locate and analyze coal deposits.

► New treasurer of the Salt River Project is **Leo H. Dwerlkotte,** a former executive of Western Air Lines. He succeeds **Seth G. Bazzill** who retired recently.

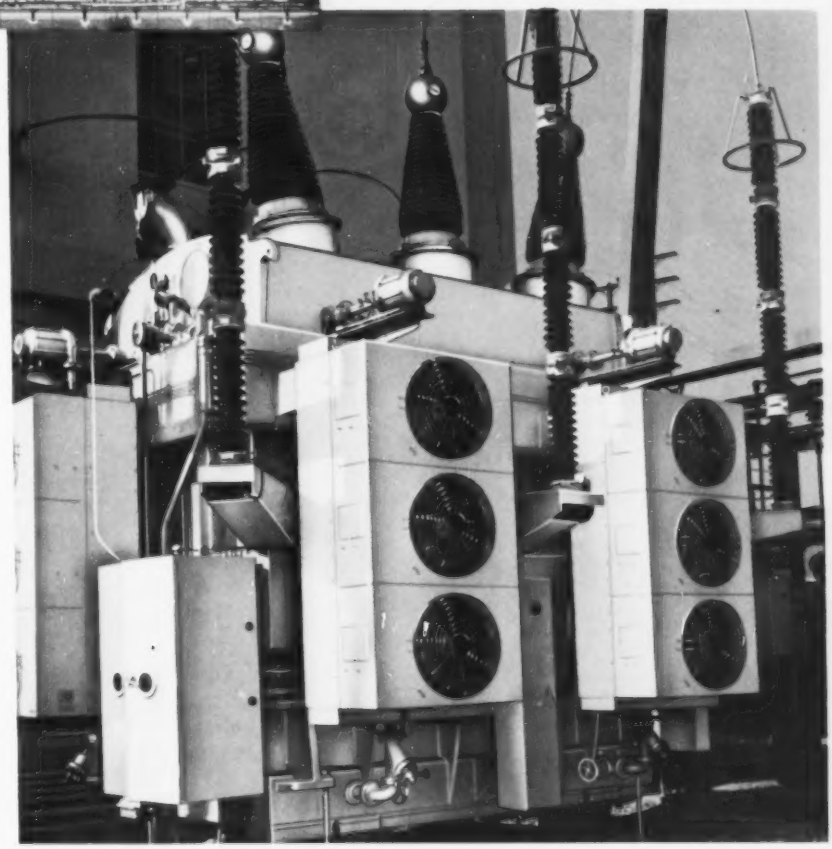
► **Ben L. Peterson,** chief of the engineering division of the Portland District, Corps of Engineers, has announced his retirement for health reasons. During his tour with the Portland District he played a major role in the planning and construction of The Dalles, Lookout Point, Dexter, Hills Creek and Cougar dams and many other projects.

For vital expansion in limited space . . . Los Angeles chose power transformers

by PENNSYLVANIA



ONE OF THREE 100,000 KVA PENNSYLVANIA POWER TRANSFORMERS located at Receiving Station A of the City of Los Angeles, Department of Water and Power. The units feature Pennsylvania's shell-form Contour Design. High voltage: 138,000 Grd.Y volts. Low voltage: 34,500Y volts.



Completed in 1917, Receiving Station A was the first substation constructed for the City of Los Angeles' power system. When expansion ultimately became necessary, studies indicated a need for 300,000 kva, or two-and-a-half times the existing capacity of 120,000 kva. Since no new station sites were available in the area, this expansion had to take place within the relatively limited confines of the original station.

Three 100,000-kva Pennsylvania Power Transformers were chosen to step down the transmission voltage of 138 kv to the 34.5 kv utilized by the station's distribution system. Because of the compact shell-form Contour Design of these three-phase transformers, the needed increase in kva capacity was achieved with room to spare. In addition, compactness and ease-of-handling simplified the job of first placing the transformers in temporary locations and then permanently positioning them so that two units always were in service, thus keeping the station in operation.

The ability to withstand earthquake shock was one of the special requirements that Pennsylvania engineers satisfied in designing these transformers for the City of Los Angeles. Whether your own power transformer requirements are just as unusual or strictly standard, Pennsylvania has the experience and the facilities to meet your needs. Contact Pennsylvania Transformer Division, McGraw-Edison Company, Box 330, Canonsburg, Pa.

McGRAW EDISON

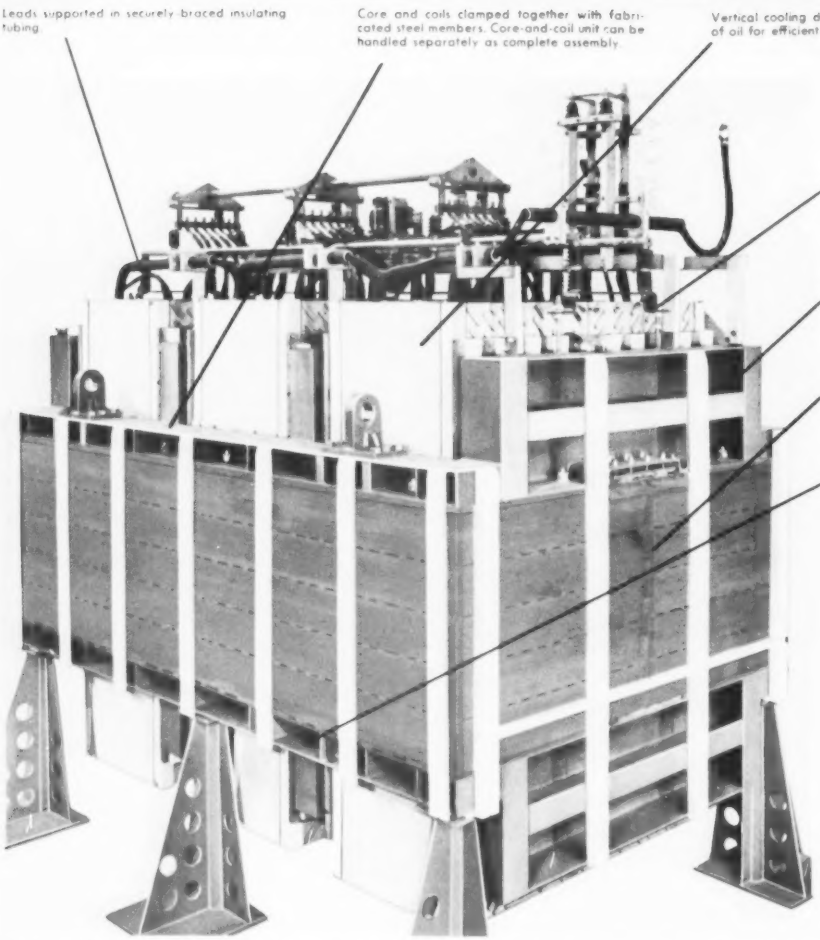
PENNSYLVANIA TRANSFORMERS

PENNSYLVANIA POWER TRANSFORMERS

See other side for design details

One of Three at Los Angeles Receiving Station "A"...

100,000 Kva THREE PHASE CONTOUR DESIGN Pennsylvania Power Transformer


Leads supported in securely-braced insulating tubing.
Core and coils clamped together with fabricated steel members. Core-and-coil unit can be handled separately as complete assembly.
Vertical cooling ducts in coils permit free flow of oil for efficient cooling.
Tap changer supports securely bolted to frame members.
Sturdy, fabricated box sections of core frame clamp coils to protect against mechanical forces during short circuits.
Core cooled by both vertical and horizontal ducts.
When core-and-coil assembly is tanked, bottom frame member rests on flange of lower tank section.

Designed to Withstand Earthquake Shock

100,000 kva, three phase, 60 cycles, 55 C. temperature rise. Forced-oil, forced-air-cooled. High voltage: 138,000 Grd.Y volts. Low Voltage: 34,500Y volts. Shell-form Contour Design.

PENNSYLVANIA HAS THE *FACILITIES* AND THE *CAPABILITY* TO MEET THE LARGEST POWER TRANSFORMER REQUIREMENTS...

- A large, expertly-staffed engineering department with long experience in power transformer design—both core form and shell form.
- The ability to design and construct scale models for proving design characteristics.
- A modernly equipped plant capable of producing and testing the highest rated units contemplated by industry today.
- Handling and loading facilities that permit full utilization of manufacturing, shipping and installation economies.

McGRAW EDISON

PENNSYLVANIA pt TRANSFORMERS

PENNSYLVANIA TRANSFORMER DIVISION

McGraw-Edison Company

CANONSBURG, PENNSYLVANIA Greater Pittsburgh District

See other side for installation view . . .

Association Affairs

PCEA Hawaii Plans Conference

More than 400 industry delegates are expected to be on hand for the seventh biennial conference of the Hawaiian Pacific Coast Electrical Assn. which will be held at the Princess Kaiulani Hotel in Honolulu on Nov. 5 and 6, 1959.

Drawing inspiration from its theme, "Watt's Ahead," the meeting's program promises to assist the electrical industry in planning and working towards a future which bodes tremendously increased sales.

Under the chairmanship of Herbert Heinrich, manager, commercial department, Hawaiian Electric Co. Ltd., the conference committee has scheduled a host of nationally prominent industry leaders to address the sessions. Speakers and topics include:

Howard Arnett, vice-president, Portland General Electric Co., **Why This Meeting;** Sherman Knapp, president, Connecticut Light & Power Co., **The Electrical Industry and Area Development;** Robert E. Ginna, chairman of the board, Rochester Gas & Electric Co., **The High Temperature Gas-Cooled Reactor Project** (A short cut to the goal of economic atomic power); Ronald Reagan, star of motion pictures, radio and television, **Business, Ballots and Bureaus;** Walter J. Maytham, vice-president, Westinghouse Electric Corp., **Build Business Electrically;** C. K. Rieger, vice-president, General Electric Co., **Watt's Ahead in Appliances;** A. C. Monteith, vice-president, Westinghouse, **Expanding Our Horizons;** E. L. Robinson, vice-president, Gulf States Utility Co., **Load Building on the Louisiana-Texas Gulf Coast;**

C. C. Walker, vice-president, General Electric, **Managerial Skills for a New Age;** Lt. Gen. Bernard Schriever (or alternate), U. S. Air Force, **Watt's Ahead in Space Exploration;** T. V. Learson, vice-president, International Business Machines Corp., **Roboting the Industry;** H. G. Dillin, executive vice-president, San Diego Gas & Electric Co., **Pricing Watts;** F. E. Bodine, assistant to vice-president, Westinghouse, **Keep Them Satisfied;** Arthur C. Barr, manager of application engineering, Nela Park, General Electric, **New Frontiers in Lighting;** Carlo Panfiglio, president, American Electric Co., **Wiring for Load;** Alf Hansen, turbine engineer, General Electric, **Applications of Gas Turbines in Hawaii;** T. A. Lowe, research engineer, Kaiser Aluminum and Chemical Co., **Corrosion Performances of Aluminum, Aluminized Steel and Galvanized Steel Hardware in Hawaii.**

NAED

With the theme "Your Keys to the Future," plans for the Western Region's convention of National Association of Electrical Distributors to be held at Miramar Hotel, Santa Barbara, Sept. 20-23, are fast taking shape, according to R. W. Rohrbach, regional vice-president, and W. M. Jewell, regional manager.

Notices have gone out for pre-registration.

Ken Duncan, chairman of the residential development committee, addresses NECA-utility group. Irving Thompson, branch chairman, seated at center

Industry Get-Together On Home Wiring

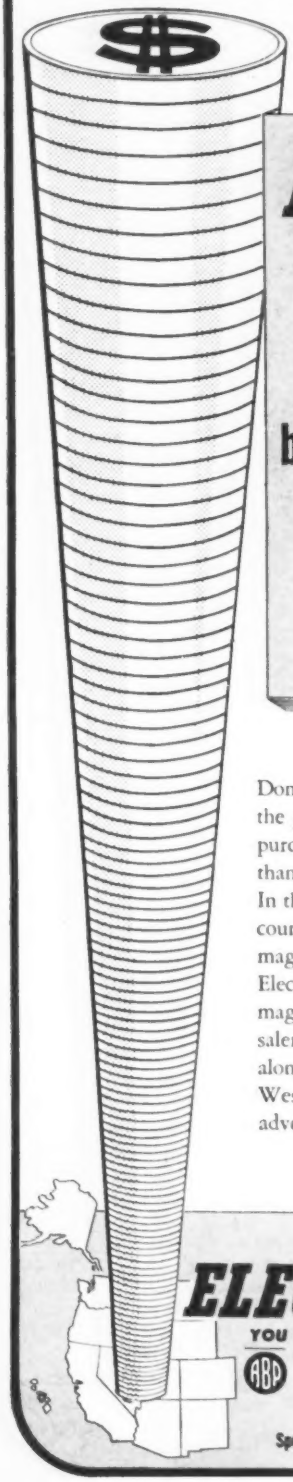
What might be done cooperatively between contractors and the utility to promote and upgrade residential wiring was the subject of a joint meeting between the Salt Lake branch of the Intermountain Chapter, National Electrical Contractors Assn., and the utility in Salt Lake City recently. Members of the business development department of Utah Power & Light Co. met with the contractors. Irving Thompson, chairman of the Salt Lake branch, presided.

A. R. Woolley, NECA chapter manager, explained that the second of two monthly meetings of the chapter is devoted to some form of inter-industry get-together to create understanding and mutual respect. Ken Duncan, Bountiful contractor, described the NECA services and the marketing program. Woolley then asked for questions. "We NECA contractors are not now important in the residential field but we want to be," he said. "We also want to interest more of those who are doing residential wiring to join with us in doing something about it whether or not they belong to the association."

Duncan explained that they wanted all residential wiring contractors to come together and discuss their mutual problems and learn how to develop more of this type of business. They felt that those who were serious minded would help to upgrade it and eventually might become members.

DeLamar Holt and George Earle of the utility told of the company's residential men in the field talking to customers about Housepower and of the prospects that they develop for work. They asked for some coordination in the handling of such prospects and a definite follow-up of them by contractors. Holt also announced that the company would start issuing Medallions for modernization of old homes. Further meetings along these lines are contemplated by both utility and NECA.

You need the complete coverage of



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A McGRAW-HILL PUBLICATION

Spokesman of the Electrical Industry of the West for 72 Years

Meeting Dates

Already dates and places for many conventions and meetings in 1960 have been announced. The Pacific Coast Electrical Assn. has set the dates of Feb. 29-March 1 for its Business Development Section meeting at Hotel Lafayette, Long Beach; March 28-29 for the Engineering & Operating Section meeting at a location yet to be selected; April 11-12 for the Administrative Services Spring Conference at the Huntington-Sheraton Hotel, Pasadena; and the annual convention will be May 16-18 in Las Vegas at the new civic auditorium.

A Commercial and Industrial Lighting Conference will be staged by the Electrical Maintenance Engineers Assn. of California together with its 1960 Electrical Industry Show in the Shrine Exposition Hall, Los Angeles, March 23-25. Urban Beh, consulting lighting engineer, is chairman of the lighting conference, while the show will be under the chairmanship of Charles Hayes, president of Electrical Estimators, and Robert Markham of Hughes Aircraft.

Northwest Electric Light & Power Assn. has announced 1960 dates as follows: Engineering & Operating Section joint meeting with Personnel & Safety Section, Hotel Florence, Missoula, Mont., April 27-29; Business Development Section, Chinook Hotel, Yakima, May 23-25; Accounting & Business Practice Section, Benson Hotel, Portland, June 15-17; and 53rd annual meeting, Glacier Park Lodge, Sept. 7-9.

National Electrical Contractors Assn., which held its recent Tri-District meeting at Glacier, will hold next year's meeting in Seattle April 13-15. The joint six-state District 5 NECA and IBEW convention will be held May 9-12 at the Westward Ho in Phoenix.

Among other conventions already announced for next year in the West are: Western Joint Computer Conference, in San Francisco, May 3-5; Western Air Conditioning, Heating, Ventilating & Refrigeration exhibit and conference, Shrine Exposition Hall, Los Angeles, April 27-30; National Committee for Utilities Radio, Continental Denver Hotel, June 15-17.

While dates have not been announced as yet for Illuminating Engineering Society regional conferences it is decided that the South Pacific Coast region will meet in southern California and hold its regional activities meeting in Santa Barbara.

Electric Clubs

Election time has come to some electric clubs. The **Los Angeles Electric Club** has as its slate of officers for next year George N. Hawley, Southern California Edison Co., for president; T. M. Blakeslee, Department of Water & Power, first vice-president; Albert W. Tracy, Anaconda Wire & Cable Co., second vice-president; L. Dean Fowler, General Electric Co., third vice-president; O. J. Paul, Ralph M. Parsons Co., secretary-treasurer; and Frank E. Reeves, Automatic Switch Co., sergeant-at-arms. William B. Meek, Westinghouse Electric Supply, the past president, Theron M. Goodrich, Pasadena Light & Power, Stanley M. Johns, the Electric Corp., Charles A. Wikle, A. S. Schulman Electric Co., and Howard C. Johnson, Thomas & Betts Co., were named to the executive committee.

East Bay Electric Club in Oakland also elected officers. They are Robert Wallace, Triangle Conduit & Cable Co., president to succeed Robert Gordon, Day-Brite Lighting; Herb Arnett, Sangamo, vice-president; Robert Scholes, G-E Supply Co., secretary-treasurer. Directors are Robert Gordon, Oak Adams, Grant Radford and Robert Flynn for a one-year term; R. W. Hambric, J. R. Cowan and Lee Hertzberg a two-year term.

San Diego Electric Club wound up its motor winding contest honoring 40 students from nine high schools and their industrial arts instructors. H. G. Dillin, executive vice-president, San Diego Gas & Electric Co., made the presentation of awards. It was the 11th annual such contest run by the club.

Victoria Electric Club, which meets each Tuesday noon, recently heard from J. D. Smith about a proposed parking and shopping mall and W. Walker, staff engineer of B. C. Electric, on nuclear power possibilities. At another meeting W. C. Mearns, vice-president, B. C. Electric, discussed the "Power Requirements of B. C." and Mr. Groome of Holophane Co. demonstrated lighting control equipment.

San Mateo County Electric Club, meeting on June 2, elected Bill Hilton, PG and E, as president, to succeed Mike Wright of Ets-Hokin & Galvan; Art Gingell, Kaiser Aluminum & Chemical Corp., vice-president; Louis Rolla, Coast Electric Co., secretary; and as directors, Ira Allen, California State Department of Industrial Safety, Sil Chiappari, North State Electric Supply Co., and Werner Diederichsen, IBEW.

IAEI

Oregon Chapter, IAEI, meeting at Pendleton, Ore., May 9 under Chairman Don Swartz, chief inspector, Eugene, discussed changes in the forthcoming edition of the National Electrical Code. They also heard the aluminum conduit and cable story from Leon Guibara, Kaiser Aluminum & Chemical Corp. At the previous meeting in McMinnville, Dr. J. K. Trolan took them on a tour of Linfield College Electrical Research Institute. H. V. Nelson, application engineer, General Electric Co., gave an illustrated talk on static switching controls which his company calls "static control" and Westinghouse designates as "Cypac."

A schedule of meetings for the year was set up at that meeting, the next of which will be at Medford Aug. 8 or 15 and a meeting in Portland Nov. 14 after the Northwest Section annual meeting in Seattle Aug. 17-19.

Eastern Washington Chapter, IAEI, met in Coeur d'Alene, Idaho, May 1 and heard W. L. Gaffney, Northwest Section's secretary and council member, discuss the new code changes. Square D Co. made a presentation of the new circuit breakers.

Utah Chapter, IAEI, met at the Provo City Electric Department May 12 under new Chairman William Whetton of Ogden. Jay Petree, Salt Lake City sales engineer for Crouse-Hinds Co., discussed and demonstrated explosionproof equipment and the requirements of the national code and Underwriters' Laboratories for tests.

Southern California Chapter, IAEI, met at the Torrance plant of Rome Cable Co. on May 20 under Chairman E. V. Muller, State Division of Industrial Safety. After a tour arranged by R. E. Gates, manager, Rome conduit sales, a business meeting was held.

Southwestern Section, IAEI, annual meeting, at Hotel Flamingo, Santa Rosa, Aug. 31-Sept. 3, will again feature workshop code sessions to cover residential, commercial and industrial sections of the code. An extra day is being provided to prepare the recommendations coming from these workshops in better form for submittal to the entire membership and approval for referral to the code-making panels. Registrations are being received by Lou La Fehr, secretary-treasurer. Hotel or motel reservations are to be made individually. A manufacturers' exhibit is being arranged for by La Fehr.

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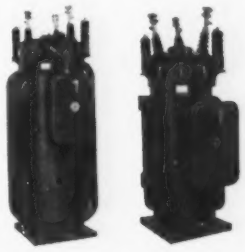
WESTINGHOUSE 1¼%-STEP REGULATORS

Do you always know . . . for sure . . . the position of the tap changers in your regulators? You can, with the Westinghouse position indicator which gears down from a higher speed cable drive. This eliminates drive cable error, prevents danger of bypassing off-neutral position. Dial can easily be read from the ground.

In addition, where load range selection is used, internal indicator detents prevent movement of limit switches from set position to provide positive range limits.

Here is more evidence that Westinghouse feeder voltage regulators are safer to operate, assurance that you can offer better service . . . all the time. J-70901



Westinghouse URF and URL single-phase feeder voltage regulators

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

► American Institute of Electrical Engineers, Spokane Section, recently elected **Wendal A. Morgan** as chairman; **Joseph F. Eyrich,** vice-chairman; **Hubert E. Hattrup,** secretary-treasurer; and board members **Earl R. Anderson, Elwood M. Lee** and **John J. Magnam.**

► Utah Section, AIEE, elected **F. C. Bates,** consulting electrical engineer, as its chairman, succeeding E. W. Hendron, General Electric Co. **R. W. Moody,** Utah Power & Light Co., was named vice-chairman and **C. R. Lufkin,** G-E, secretary-treasurer. Directors include J. E. Thomas, J. N. Jones, S. D. Hammond, R. H. Stocking, R. K. Bertoch and D. T. Young.

Meetings Calendar—1959

AUGUST

11-14—*International Association of Electrical Leagues,* annual conference, Hotel El Cortez, San Diego.

18-21—*Western Electronic Show and IRE Convention,* Cow Palace, San Francisco.

24-26—*International Association of Electrical Inspectors,* Northwestern Section annual meeting, Seattle.

31-Sept. 3—*IAEI,* Southwestern Section annual meeting, Hotel Flamingo, Santa Rosa, Calif.

SEPTEMBER

7-11—*Illuminating Engineering Society,* National Technical Conference, Mark Hopkins and Fairmont Hotels, San Francisco.

16-18—*AIEE-ASME,* Engineering Management Conference, Los Angeles.

16-18—*NWPPA,* Power Use Workshop, Ephrata, Wash.

20-24—*National Association of Electrical Distributors,* Western zone convention, Hotel El Miramar, Santa Barbara.

25—*Intermountain Electrical Assn.,* Fall Dealer Conference, Newhouse Hotel, Salt Lake City.

28-30—*NELPA,* annual convention, Hotel Vancouver, Vancouver, B. C.

30-Oct. 1—*NWPPA,* Accounting & Finance Workshop, Clark County PUD, Vancouver, Wash.

OCTOBER

25-29—*RMEL,* annual convention, Broadmoor Hotel, Colorado Springs.

NOVEMBER

5-6—*PCEA Hawaiian conference,* Princess Kaiulani Hotel, Honolulu.

16-17—*PCEA,* Administrative Series, Rickey's, Palo Alto, Calif.

27-Dec. 2—*San Diego Bureau of Home Appliances,* annual Electrical and Home Appliance Show, Electric Building, Balboa Park, San Diego.

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There's No Other Paint Like Subox

. . . Because Subox is the only paint in the United States made with chemically-active lead-suboxide. Unlike the pigments of inert paints, lead-suboxide changes chemically after drying to form an increasingly tough protective coating – rust inhibitive, acid and alkali resistant. Subox effectively safeguards metal surfaces: buildings, transformers, fences.

. . . Because Subox paint comes in modern, bright pastel shades, as well as darker colors, painting for normal maintenance can produce attractive decoration appropriate for neighborhood surroundings.

. . . Because Subox covers with a dense, impervious film, a single coat often is sufficient. Subox is both economical and good looking.

Write today for technical literature and color card.

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Established 1924

18 Fairmount Plant, Hackensack, New Jersey

Subox Company of Canada, Weston, Toronto 15

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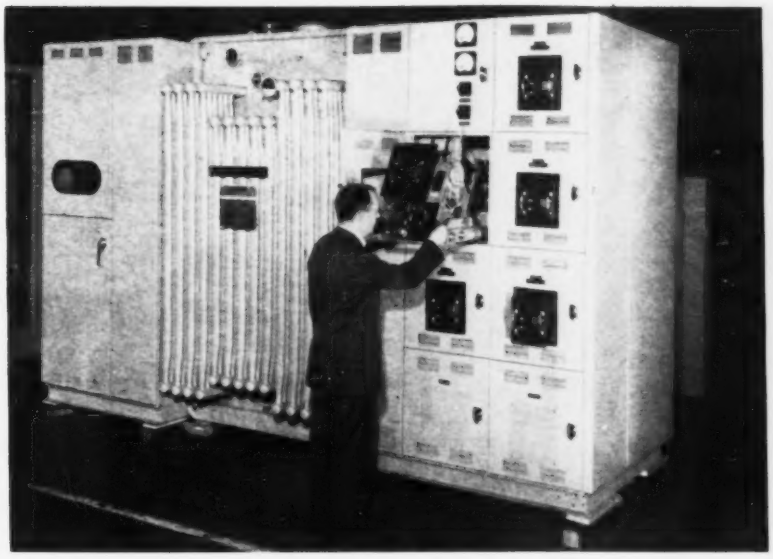
Manufacturers—Distributors



A new department for manufacture and sale of secondary unit substations and low-voltage switchgear has been opened by Pennsylvania Transformer Division of McGraw-Edison Co. According to W. R. Swoish, vice-president and sales manager, the department will handle both indoor and outdoor secondary unit substations, in both articulated and integrated designs. Articulated-type substations, which consist of subassemblies for field connection, range from 112½ through 2,000 kva and integrated-type, which are completely assembled at the factory, range from 75 through 500 kva. Normal primary voltages are from 2,400 through 13,800 v, with secondary voltages 480 v and below. Secondary unit substations may be equipped with any of the several suitable transformers manufactured by Pennsylvania, Swoish said. For indoor substations, sealed or ventilated dry-type transformers, or askarel-filled transformers normally are used. Oil-filled transformers are used in outdoor installations, he stated

► Electro Products Mfg. Co., Vancouver, Wash., manufacturer of electric baseboard heating equipment, has been incorporated as Electro-Ray Mfg. Co., according to **A. P. Wick,** president.

► **Lyle Koroch,** formerly manager of Bristol Co.'s Portland office, has joined Andrew L. Polich Inc. An electrical engineer, Koroch will handle the firm's utility business.

► **Bill Earl Sr.** of Don Burcham Co., Portland, **James A. Murphy,** sales manager of Lou Johnson Co., Portland, **Tory Horn** of Western Electric, Seattle, and **R. M. Loughrey,** Don Burcham Co., Seattle, will be four Northwest representatives at a preconference meeting at the Mark Hopkins Hotel in San Francisco on Aug. 17, a day in advance of the Wescon show, Aug. 18-21.

► Appointment of **Payne B. Johnson** as head of advertising and public relations for Stromberg-Carlson —San Diego has been announced by **Dr. Donald G. Wilson,** general manager.

► **Fred J. Kopesky** has joined Packard Bell Electronics as director of planning in the Home Products Division, it was announced by **Kenneth R. Johnson,** vice-president in charge of the division. Kopesky had been in charge of market planning for RCA's Radio-Victrola Division in Cherry Hill, N. J.

► Salt Lake Hardware Co. has been named franchised representative for Sylvania Electric Products in the Intermountain area. **J. C. Christiansen** is manager of major appliance sales for the firm. **A. Myrl Ray** is manager of electronic product sales.

► **Carol Shemick,** former home economist for Procter & Gamble in the Los Angeles area, has been appointed assistant to the director of consumer relations for Waste King Corp.

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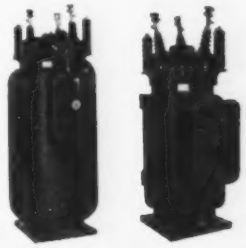
WESTINGHOUSE 1¼%-STEP REGULATORS

Are your regulators rugged enough to meet *all* the conditions they're likely to encounter over a long period of service? Well, here is an exclusive Westinghouse idea that greatly lengthens contact life. Westinghouse regulator contacts are designed to give maximum contact life under all conditions. Higher current ratings make use of a unique magnetic effect to multiply contact pressures under short circuits to prevent burning. Normal contact pressures are maintained under usual operating conditions to prevent galling.

With Westinghouse voltage regulators, you get this and many other exclusive benefits that mean longer, more dependable service. For full details, call your Westinghouse representative. J-70922



Westinghouse URF and URL single-phase feeder voltage regulators

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John C. Slothower, Minneapolis, chairman of the National Committee for Utilities Radio, tests G-E's transistorized Progress Line two-way radio at the NCUR's annual meeting in Denver. With Slothower are Harrison Van Aken, center, general manager of the G-E communication products department, Lynchburg, Va., where the new equipment will be made, and Fred Morton, G-E district communications manager in Denver. The new unit features low battery drain (0.040 amp on stand-by, high-powered models (up to 75 w) and small size (8⅝ in. wide, 12 in. long and 4 in. high). It is designed to ease the problems of utility crews that leave radios on when they are out of their vehicles

► **Fred W. Carlson & Associates,** Seattle, Portland and Butte, has been named factory representative for Utility Transformer & Equipment Co., Baraboo, Wis.

► **W. J. Burke & Co.,** Portland, is now a stocking distributor for Pacific Mercury electric plants.

► **Lou Garrison** is lighting specialist for Stubbs Electric Co., having moved up from a position in the firm's quotation department.

► **Bendix Computer Division's** district sales office, serving the San Francisco Bay area and the Northwest, has moved to larger quarters in downtown Oakland at 1330 Broadway, Suite 1121.

► **California Wholesale Electric Co.,** which has taken on the Cadweld line of welding devices for the southern California area, invited about 80 engineers and maintenance people to a demonstration of the devices on July 14.

Commemorating its 65th anniversary, Kuhlman is turning out a newly designed transformer at its Salinas, Calif., plant. One of three Kuhlman transformer factories, the Western operation was set up in 1955. Taken at a recent anniversary celebration there, this picture shows Harry Wise, plant superintendent, receiving a pin from Kuhlman Fluehr, quotations and personnel manager. Looking on are G. B. Fluehr, Western regional manager (left) and Walter Thompson, Western sales manager (right)

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CONVENIENT

WESTINGHOUSE 1¼%-STEP REGULATORS

In addition to dependable operation, convenience and versatility are reasons that make regulators more valuable to you. With pad- or platform-mounted URF units, for example, Westinghouse supplies a hand crank for manual operation of the tap changer. Positions may be changed with the regulator de-energized or motor circuit inoperative.

For data on this and many other exclusive convenience features of Westinghouse regulators, get in touch with your Westinghouse representative. J-70923

Westinghouse URF and URL single-phase feeder voltage regulators

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WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

SAVE

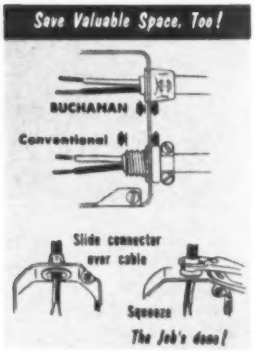
up to 15¢ every time you install a

BUCHANAN

pres-SURE Romex Connector*

No other Romex Connector gives you all these important advantages . . .

LOWER INSTALLED COST — Save up to 2-minutes installation time per connector. On-the-job experience has shown that installed costs are lower than conventional connectors, — regardless of connector cost.



MORE WIRING ROOM — Connector extends less than 3/64" into box.

EASIER TO INSTALL — One quick simple squeeze with channel-lock or electrician's pliers simultaneously locks connector to cable and box. To install, merely insert cable in box knockout and slide connector over cable. No clamps, screws or lock nuts.

QUICKER TO REMOVE — An equally quick and simple squeeze at 90-degrees to installation "crimp" simultaneously unlocks connector from cable and box.

BETTER CABLE PROTECTION — Extra large bearing surfaces distribute pressure on cable to minimize insulation abrasion.

BETTER OVERALL PERFORMANCE — Exclusive "crimp-type" installation insures permanently-tight vibration-proof connections of high tensile strength. No screws or nuts to work loose. Special high grade aluminum alloy can't rust.

¾" trade size—fits standard ½" knockout.

Approved for 14/2, 14/3, 12/2, 12/3 and 10/2 non-metallic sheathed cable.

Also adaptable for use on:

- Portable cords or 10/3 Romex (⅛" or smaller diameter).
- (2) 12/2 or smaller Romex.
- 12/2 or smaller UF.
- 12/3 UF (by slightly pre-flattening connector).

***Catalog No. 1050—An exclusive Buchanan development (Patent 2527227).**

Ask your distributor, or write for samples and Bulletin W-8

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ELECTRICAL PRODUCTS CORPORATION
HILLSIDE NEW JERSEY

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Growth

New Research Resource

June 25 saw the dedication of General Atomic's John Jay Hopkins laboratory for pure and applied science at San Diego, California. The addition of this significant laboratory in the West further bolsters the might of atomic know-how in the West. Of considerable interest to the power industry are the three programs supported by the utility industry that will be implemented by the personnel and equipment at the Hopkins laboratory. Most talked about is the HTGR plant supported by 51 utility organizations which will be placed on the Philadelphia Electric Co.'s system. This unit should be in operation by 1963 and will enable the industry to return to modern steam turbine conditions.

A second program jointly sponsored by General Dynamics and the Texas Atomic Energy Research Foundation, composed of 11 Texas utilities, will probe into the secrets of control thermonuclear reactions. With staggering technical obstacles the end result of this farsighted research can mean power in quantities and at prices undreamed of today.

Studies into the direct conversion of heat to electricity are sponsored by the Rocky Mountain — Pacific Nuclear Research group composed of eight Western electric utility companies. Static conversion devices are in vision, which would compete favorably with the steam turbine once they achieve conversion efficiency of about 30%.

In commenting on the potentialities of the laboratory, Prof. Niels Bohr commented on the similarity between research at the atomic level and social and biological research. He stated, "Of course, on this occasion I shall not enter more closely into the similarities in logical respect between atomic physics and other domains of experience, but I want to stress that any increase in our knowledge and abilities at the same time implies a greater responsibility due to our increased power of shaping the conditions for human life."

► Principals of the Thermal Power Co. have announced that a new well has "blown in" at the sight where PG and E is developing existing geothermal wells. Seven new wells will be drilled several miles from the present site in an effort to determine the full potential of the area.

College Gets Reactor

A research reactor now under construction at Washington State College will go into operation sometime this summer.

The reactor will be used as a research tool, as well as for undergraduate and graduate instruction.

The reactor will be available for research projects by all departments, as well as to faculty members of other institutions in the area.

WSC's reactor has a maximum capacity of 1,000,000 w. It will cost $600,000, half coming from a National Science foundation grant and half budgeted by the college. The college has also received a $108,000 grant from the Atomic Energy Commission to equip laboratories and to erect a small subcritical teaching reactor.

The three-story building that houses the reactor also includes four laboratories for research and teaching. The reactor is a swimming-pool type holding 70,000 gal of water into which the uranium fuel will be suspended from a bridge at the top of the pool.

Radiation for experimental use will be directed through a series of beam ports located around the edge of the pool. The water, plus concrete walls 6 ft thick, will provide the shielding.

Fuel will be in the form of 30 aluminum-uranium fuel elements, each 2 ft long. They will contain up to 140 grams of uranium. Twenty-two graphite reflector elements will surround the fuel elements.

Areas of research to be studied through use of the new unit are varied and include:

1. Effects of radiation on electrical insulators
2. Effects of radiation on the photoelastic and physical properties of plastic materials
3. Effects of radiation on age hardening properties of alloys
4. Use of activated materials in study of wear and lubrication
5. Use of isotopes and radiation in studying receptivity of wood surfaces for adhesives and paint films
6. Use of tracers in hydraulic studies, use of tracers in nutrition studies in poultry
7. Growth and nutrient requirements of eggs and chicks after exposure to radiation
8. Study of fixation of nitrogen by radiation
9. Reactions of some free radicals formed by radiation
10. Effect of radiation on metallic corrosion
11. Mechanisms and inhibitors
12. Mutations by radiation on smut fungi
13. Study of methods of activation analysis

Students will be trained in handling of radioactive materials by laboratory work with safe, short-lived radioactive isotopes produced with the reactor. At the graduate level, students will be able to earn advanced degrees in a variety of fields by carrying out research work supported by the reactor.

► The final phase of construction work has been started on the plutonium recycle test reactor for Hanford Works. The reactor is expected to be completed in the spring of 1960. In recycling, the first fuel charge will be enriched uranium.

YOU CAN GIVE BETTER SERVICE CONTINUITY WITH

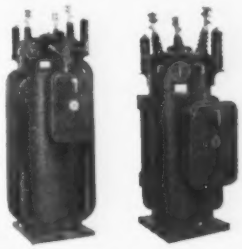
GREATER CAPABILITY

WESTINGHOUSE 1¼%-STEP REGULATORS

Here is a simple . . . and exclusive . . . design feature that makes a great deal of difference in the year-in and year-out performance of a regulator. The tap changer in Westinghouse regulators is isolated from the coils. Carbon formed during arcing is retained in the separate tap changer compartment. Result? Coils are kept clean . . . they operate cooler and retain higher load-carrying ability.

This is just one reason why a Westinghouse regulator can lead a longer and more useful life on your distribution line. For more facts, call your Westinghouse representative.

J-70924



Westinghouse URF and URL single-phase feeder voltage regulators

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Keeping line clearance costs DOWN goodwill UP

Proven power equipment and Davey trained rope climbers . . . that's what makes Davey Surgical Line Clearance so economical. Utilities can rely on the dependable, efficient, and *adaptable* Davey crew. It will pay you to talk over your tree maintenance problems with the West's leading line clearing specialists—Call Davey.

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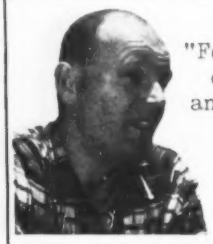

"For a combination electrical field office and storage shed that's quick to move on and off the job, I like Porta House. We have them on several jobs."

Just telephone Porta House collect and get immediate delivery. Prefabricated, bolted, waterproof plywood panels—can be moved on a pick-up truck.

SIZES 6' OR MORE BY 9' OR MORE.

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Western Division—One of the New Majors

Outstanding opportunity for 30-40 year old sales executive with demonstrated background of achieving goals through people. Will administer 15 man sales force reporting through two regional sales managers; manager of sales administration; pricing and quotations manager with a 5 man staff and will be a member of policy formulating staff group. West Coast Division is presently primarily engaged in fluorescent equipment manufacture and is one of 4 majors with approximately 15% of the market. Write for a job description. Send details of your background. Write Box 303, Electrical West, San Francisco 4, Calif.

Market Development

West Adds Medallions

That the West is out in front in Medallion Home promotion is shown in a survey of eight Western states reported by Frank Falge, Western regional manager, Live Better Electrically.

Thirty out of 43 participating utilities reported these objectives: 22,662 bronze and 3,773 gold medallions placed in 1959; 31,445 bronze and 6,529 gold in 1960. Twenty-nine of these utilities have signed up 2,017 builders. Other findings:

Electric home heating is being promoted by 21 utilities, three of them now having or filing for an electric heat rate. All utilities answering this question said there was no FHA penalty for electric heating. Only one said larger down payments were required but three said larger incomes were required.

Fourteen reported that architects had "some reluctance" on electric heating and nine said home builders had. As for the homeowner, six utilities answering said there was some "reluctance" and eight indicated "acceptance."

Average bronze medallion annual kwh was 10,446; gold, 21,282.

Market Grows for Air Conditioning

Seldom considered a market for air conditioning, coastal British Columbia is making a successful effort to develop this type of business since a survey made in 1957 showed that 4,500 tons had been installed in commercial buildings that year. New buildings under construction now automatically provide air conditioning. The Burrard Building is an example in Vancouver. It is felt that a $30 million market can be developed.

A campaign is currently running to interest building owners and managers as well as the general public. Typical was a recent show carried on in Lillooet and Ashcroft in the Frazer Canyon area in cooperation with local contractors.

Air conditioning presentations running 1½ hours were made to groups of 100 people. Equipment demonstrations were made by the contractors and manufacturers' representatives. Everything was shown

The Westinghouse Total Electric Home is one of the industry's exhibits at the Oregon Centennial, which is expected to attract four million visitors before its close in September. PP&L and PGE also are exhibitors at the Portland celebration

from fans for attics and barns to window-type units and complete air conditioners. Special stress was made of package equipment, etc.

Heat pumps and their operating costs were discussed at a special meeting for contractors and builders at the Sacramento conference. On the panel here are: George H. Wessler, Carrier Corp., Arch McCalla, Sacramento FHA office, Harold Boothby, Boothby Air Conditioning & Sheet Metal, and Paul Carrington, SMUD, moderator

Heating Clinic

Two conferences on electric heating methods were held in Sacramento recently. A commercial industrial electric space heating clinic was held first, jointly sponsored by National Electrical Contractors Assn., IBEW, Sacramento Valley Electrical League, SMUD and five manufacturers. In the three days, the eight speakers covered the market potential, design principles, selling techniques, operating cost and various heat applications.

The other was a two-day heat pump exhibit and conference sponsored by the Sacramento Municipal Utility District with a special meeting for builders, featuring a panel discussion.

YOU CAN GIVE BETTER SERVICE CONTINUITY WITH

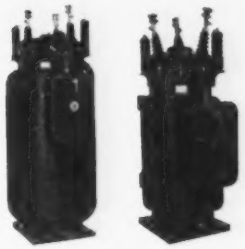
DURABLE

WESTINGHOUSE 1¼%-STEP REGULATORS

The larger steps . . . 1¼% steps . . . of the Westinghouse regulator actually lengthen its life and cut overall maintenance. Larger steps reduce the number of operations. This, together with optimum contact speed, reduces tap changer contact burning. Burning is spread over 20 or more stationary contacts . . . *actually more contacts than other regulator designs with a greater number of steps.*

This is only one of the many ways Westinghouse regulators are more durable than any other you can buy. For more information, call your Westinghouse representative.

J-70925



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WEST'S MOST COMPLETE AND DIVERSIFIED STOCK OF
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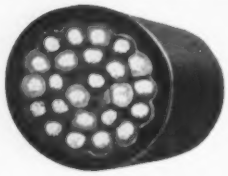
IMMEDIATE DELIVERY—CUT TO YOUR SPECIFICATIONS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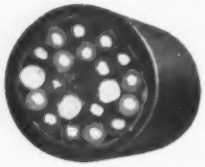
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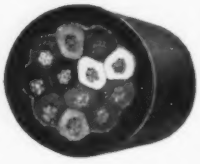
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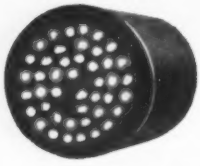
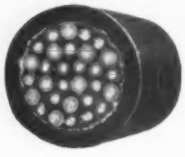

#16/44 conductor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#16/5 conductor

Sizes from 22 AWG to 8 AWG and up to 200 conductors IN STOCK!

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WILLIAM CERESKE
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1401 MIDDLE HARBOR ROAD OAKLAND 20, CALIFORNIA

SAVE on all your electric wire and cable requirements. For immediate service, phone TEmplebar 2-3546 (Oakland) and ask for "Scotty" or write for current listing of sizes and specifications.

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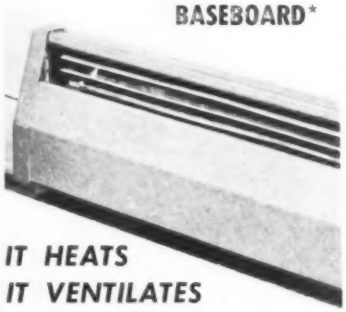
REASONABLY PRICED
WITH HEATSUM VENTILATED BASEBOARD*



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IT VENTILATES
IT CAN FILTER
THE AIR TOO

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Superintendent, Hydro-Maintenance

To assume full charge of mechanical, electrical and general maintenance activities on a new hydro-electric generating plant. One 66,000 kw unit is to be put into operation next year; additional units to a total of 300,000 kw are to follow. Persons thoroughly experienced in maintenance of generators, turbines and reservoirs are invited to write for application form and further information. Sacramento Municipal Utility District, P. O. Box 2391, Sacramento, California.

Summer Training For Home Ec Girls

Six college students majoring in home economics are getting valuable experience in the field through a summer training program sponsored by Southern California Edison Co.

After indoctrination at the company's Los Angeles general office, the girls were assigned to district offices for specialized training under professional home economists on the Edison staff. For diversified experience, each will spend part of the summer working out of her "base" office and the rest at one or more "rotation" offices.

The trainees will make courtesy home calls and help conduct demonstrations of electric appliances. They also will assist with special programs at Edison Electric Living Centers and at various community clubhouses.

Coordinating the program are Evelyn Conant, Edison's director of home economics, and Barbara Swain, staff home economist.

► A home freezer promotion throughout the entire area served by **B. C. Electric Co.** has been under way during the summer with Marge Segwick, home economist, giving demonstrations of freezer storage and cooking on an electric range from freezer-stored foods. The range and water heater promotion of the company is conducted in conjunction with contractor-dealers in the coastal area in cooperation with the Electric Service League.

► An annual award to the manufacturer making the outstanding contribution to the industry's "Beat the Heat" promotion has been set up by the **Air Conditioner Section of NEMA.**

► June of 1959 saw Southern California Edison enter into contracts for Medallion homes and apartments with twice as many builders as were signed up during June 1958. T. M. McDaniel Jr., vice-president of the utility, said that southern California is leading the rest of the nation by a considerable margin in the Medallion Home program.

OPPORTUNITIES for experienced ELECTRICAL DISTRIBUTION ENGINEER and ELECTRICAL SUB STATION DESIGN ENGINEER. Rapidly growing Southwestern utility. Age 25-40. Graduate Electrical Engineer preferred. Arizona Public Service Company, P. O. Box 2591, Phoenix, Arizona.

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WESTINGHOUSE 1¼%-STEP REGULATORS

Here is a Westinghouse innovation that provides dual protection, but which is simplicity itself. A single-bolt domed cover permanently seals out moisture and air to prevent acid formation. In addition, this uniquely constructed cover has sufficient flexure to relieve any excessive internal pressures.

Ask your Westinghouse representative about this and the many other features of Westinghouse regulators, the best investment you can make in dependable regulation.

J-70926

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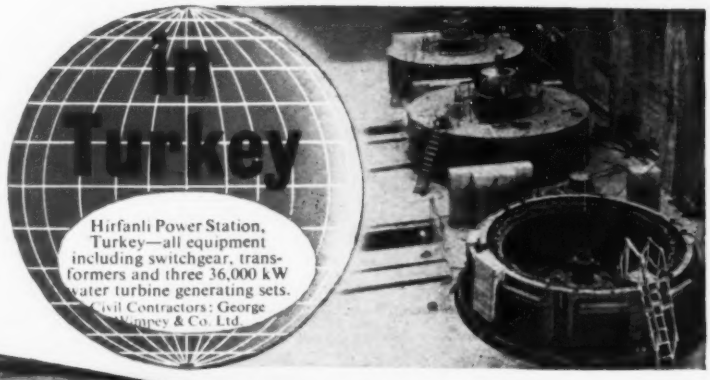
'ENGLISH ELECTRIC' water turbines and generators are meeting the power requirements of many countries throughout the world. At three major schemes in the United States, 'ENGLISH ELECTRIC' hydro-electric equipment will be adding some 1,630,000 h.p. to America's power potential.


in
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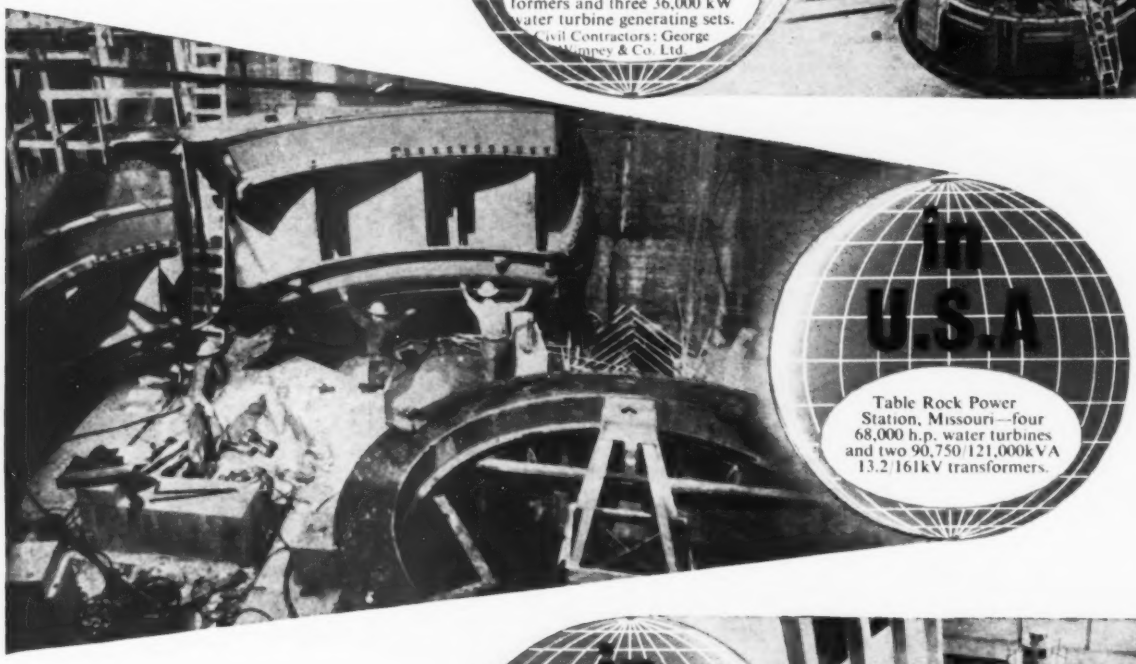

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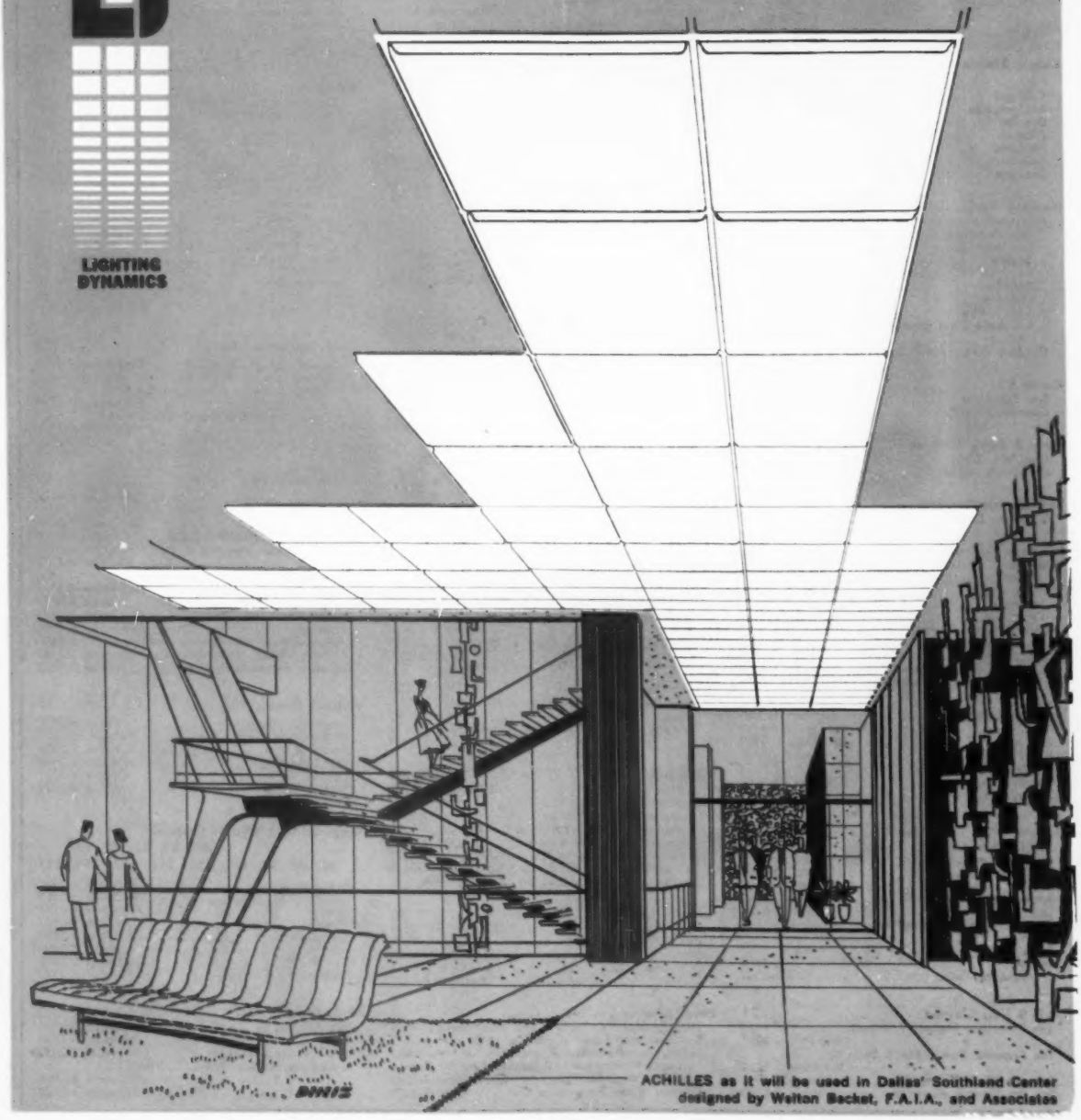

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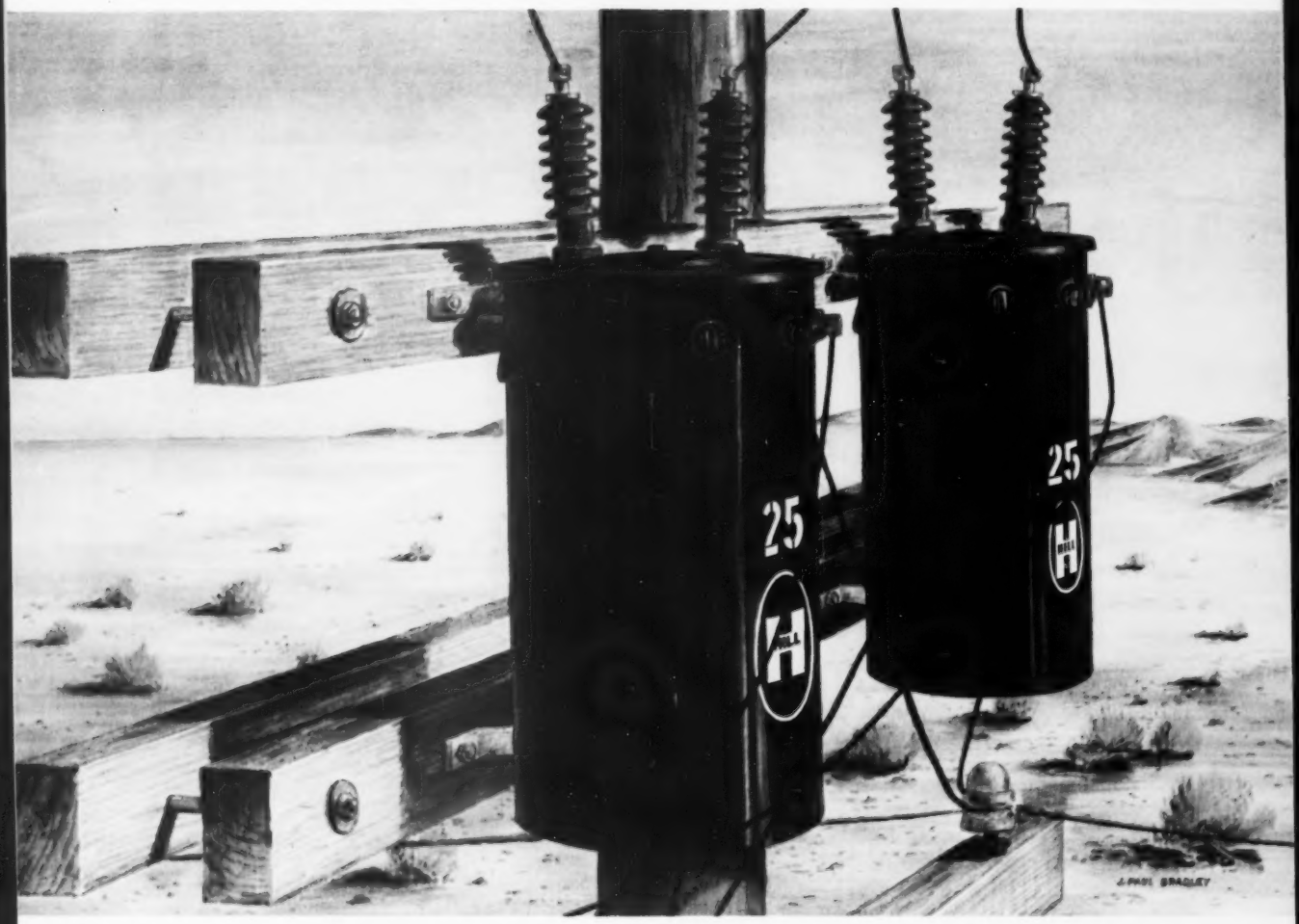

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